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Delivery Order No. 0016 [redacted]
Total Environmental
Restoration Contract
DACA31-95-D-0083

SOUTHERN MARYLAND WOOD TREATING SITE
HOLLYWOOD, MARYLAND

LOW TEMPERATURE THERMAL DESORPTION UNITS

PROOF OF PERFORMANCE RE-TESTS REPORT

July 1999

ORIGINAL
(Red)

TABLE OF CONTENTS

ORIGINAL
(Red)

LIST OF FIGURES

LIST OF APPENDICES

ORIGINAL Red

LIST OF ACRONYMS

acfm.................actual cubic feet per minute
B(a)P................benzo(a)pyrene
BTDU...............batch thermal desorption unit
CPM.................continuous process monitor
CTDU...............continuous thermal desorption
DO...................dissolved oxygen
FID...................Flame Ionization Detector
EPA..................Environmental Protection Agency
FTO..................flameless thermal oxidizer
HCl...................hydrochloric acid
ND....................not detected
MDE.................Maryland Department of the Environment
PAH.................polynuclear aromatic hydrocarbon
PCP.................pentachlorophenol
PID...................Photoionization Detector
POP.................Proof of Performance
ppb...................parts per billion
ppbv.................parts per billion by volume
ppm..................parts per million
RBC.................risk-based concentration
ROD.................Record of Decision
SMWT.............Southern Maryland Wood Treating Site
SOP.................Standard Operating Procedures
SVOC..............semi-volatile organic compound
TAP..................Toxic Air Pollutants
TCLP................Toxicity Characteristic Leachate Procedure
TDU.................Thermal Desorption Unit
TKN..................total kjeldahl nitrogen
THC.................total hydrocarbons
TPH..................tons per hour
TSS..................Total Suspended Solids
UCL..................Upper Confidence Limit
VFD..................variable frequency drive
VOC.................volatile organic compound
VRS.................vapor recovery system
WESP..............wet electrostatic precipitate
WTP.................water treatment plant

UNIT CONVERSIONS

pg.....................picogram (10^{-12} grams)
ng.....................nanogram (10^{-9} grams)
ug.....................microgram (10^{-6} grams)
mg....................milligram (10^{-3} grams)
g.......................gram
kg.....................kilogram (10^{+3} grams)

ORIGINAL
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LIST OF TABLES

ORIGINAL Red

1.0 EXECUTIVE SUMMARY

The IT Group has been authorized to conduct remedial actions at the Southern Maryland Wood Treating Site (SMWT) under contract DACA31-95-D-0083, Delivery Order 0016. Remedial actions at the SMWT consist of on-site treatment of contaminated soil and sediment, as well as on-site treatment of contaminated groundwater, surface water, and wastewater generated during the soil and sediment treatment. Contaminated soil and sediments will be excavated and treated using thermal desorption. The treated soil will be back-filled on-site once testing has confirmed that the soil has met the performance standards established in the September 1995 Record of Decision (ROD). Two on-site water treatment systems will treat groundwater extracted from areas that will be excavated, surface water from the on-site pond, and wastewater generated from the thermal desorption process. A major portion of the treated water will be reused in the thermal desorption process. The remainder will be discharged to the on-site stream in accordance with effluent standards established by the Maryland Department of the Environment (MDE).

The purpose of this report is to summarize the results of the proof of performance (POP) re-test of the continuous thermal desorption process. This re-test, including performance standards, is described in detail in the document *Proof of Performance, Summary of Full-scale Operations Addendum*, dated April 1999. ~~The re-test was successful and showed that the continuous thermal desorption unit (CTDU) can process highly contaminated soil at elevated feed rates while meeting applicable air emission standards.~~ During POP re-testing, one CTDU was tested to demonstrate attainment of soil performance, wastewater treatment plant discharge and air emission standards.

Following is an overview of the re-test results:

a. The CTDU produced air emissions that met applicable air emission standards. For setting the standards, it was assumed that both continuous units would operate at the maximum allowable feed rates and no batch units will operate at that time. All contaminants of concern met emission limits with some margin of safety. In most cases, the margin was several orders of magnitude below standards. Of those contaminants sampled at the FTO inlet (VOCs only) most met emission standards ~~during worst-case conditions~~.
b. The untreated soil used during the re-test was representative of the worst-case contamination expected at the site. Although the treated soil and hot cyclone dust did not meet cleanup criteria, this was not surprising because the untreated soil was intentionally chosen to far exceed contamination and moisture levels for which the CTDU was designed. This allowed site personnel to confirm that air emission standards would be met even in upset conditions, and helps the operators to identify the upper limit of contamination levels that can be successfully treated in the CTDUs. The site has a blending plan that is used to ensure the upper contamination limits for untreated soil are not exceeded. In brief, several "types" of potentially problematic soil were sampled in order to give an indication of the blending ratio needed. When these soils are encountered during excavation they are blended at several ratios (near calculated based on previous results). These blended soils are sampled, analyzed on-site and results are evaluated to determine the best ratio. This ratio is used for blending similar types of the soil. Using this plan, operations should never experience contamination levels that would result in failure to meet clean-up criteria at higher feed rates. During operations, treated soil and hot cyclone dust will continue to be sampled to ensure compliance with clean-up criteria.
c. The wastewater treatment plant produced water that met all applicable discharge standards except phenol, selenium, cyanide, BOD, TKN and ammonia. These exceedences are consistent with previous monthly sampling results. Water will not be discharged to the on-site stream until confirmation has been received that all limits have been met. In the interim, all water is being re-used in the TDU process.
d. Based on the above discussion, operators plan to increase the allowable feed rate of the CTDUs. The new feed rate limit will be established at the average feed rate that was experienced during the re-tests (i.e. 13.9 tph), plus a 10% margin to account for normal fluctuations in throughput. This will allow acceleration of site clean-up, which will enhance the overall goal of the project to protect human health and the environment.

A summary of the continuous unit's POP re-test results are provided in Table 1-1. Results indicate that the process, thermal desorption with condensate treatment, removed and treated a majority of

ORIGINAL (Red)

contamination as expected. High concentrations of contaminants were measured in the untreated soil and TDU condensate, but concentrations were greatly reduced (near criteria) in the treated soil, and below criteria in water treatment plant effluent (except for phenol, selenium, cyanide, BOD, TKN and ammonia) and stack gases. This indicates that the majority of contaminants (along with water) in the untreated soil were desorbed in the CTDU, captured in the vapor recovery system (VRS) with the condensate and treated by ultra-violet (UV) oxidation and carbon adsorption at the water treatment plant. Contaminants remaining in the gas phase after the vapor recovery system were further removed in the FTO. All stack gas emissions after the FTO met all air emission standards.

Discuss blending plan to address contaminants

2.0 PERFORMANCE RE-TEST PROGRAM SUMMARY

2.1 PROCESS DESCRIPTION

In overview, the thermal desorption system is comprised of multiple components to treat contaminated feed materials (soils and sediment) and contaminated vapor and liquid streams that result from the treatment process. There are two individual continuous desorption systems. A description of the continuous system is included below. Individual components of the treatment systems and pollution control equipment are linked together on separate trailers/skids and are controlled by system operators. Refer to Figure 2-1 for a layout of the system, which includes the following:

- Untreated materials-feed system.
- Indirectly heated continuous thermal desorption unit for volatilizing contaminants from feed materials.
- Treated material discharge system.
- Vapor recovery system (VRS) to remove particulates, and condense steam and contaminants from the vapor stream exiting the desorption units. The condensate will be treated at the on-site water treatment plant.
- Flameless thermal oxidizer (FTO) for final vapor polishing.

2.1.1 Soil Treatment

Contaminated soil from the site is excavated, and stored in the soil storage area. The soil is screened to less than 2 inches in diameter and then transferred via a front-end loader onto a conveyer belt that transfers soil to a feed hopper. From the feed hopper, soil is pushed with a screw conveyer inside a rotating drum in one of two indirectly heated CTDUs. Soil feed rate to the CTDU is measured by comparing the feed screw speed with the soil input at several speeds. In the CTDU, the temperature of the soil is increased by indirect heat (i.e., heat applied outside of the drum walls) to desorb contaminants as the soil travels from the feed to the discharge end. The indirect heat is supplied to the CTDU by #2 fuel oil burners. Nitrogen is added to the CTDU at the inlet and outlet face seals. This minimizes the intake of oxygen at these rotating seals, which helps in maintaining a low oxygen, non-combustible environment. A portion of the burner exhaust gas from the middle stack is recycled to the CTDU feed end as sweep gas. Sweep gas keeps the air flowing consistently through the drum and helps maintain a low oxygen environment.

The hot, treated soil from the CTDU is transferred (utilizing a discharge conveyor) to a double paddle mixer which mixes the hot soil with clean water to cool and hydrate the soil. Steam generated during the cooling of the soils, carryover particulates, and a small amount of air that is drawn into the conveyor flow to the inlet of the scrubber in the VRS. The hydrated soils are conveyed to the treated soil stockpile area. The treated soils are sampled and analyzed to ensure the backfill criteria is met.

2.1.2 Exhaust Gas

CTDU exhaust gases, consisting of sweep gas, steam, desorbed contaminants, and particulate carryover, pass through a hot cyclone to remove larger sized particulates. The units ~~have been~~ are ~~re~~configured to reintroduce hot cyclone dust back into the treated product discharge system.

The exhaust gases then enter a direct-contact quencher/scrubber, where water contacts the vapor stream, thus cooling the vapor stream to begin condensing steam and contaminants from the vapor

ORIGINAL Red

phase. Additional particulates are also removed in the scrubber system. The quencher/scrubber recycle stream is cooled by a plate type heat exchanger using water as the cooling medium. A cooling tower delivers non-contact cooling water to the plate heat exchanger and wet electrostatic precipitator (WESP) cooling jacket. Contaminants and remaining particulates are further removed in the WESP. The gas then enters the FTO for final polishing. Through the process of oxidation, the FTO virtually eliminates non-condensable and residual organics not removed by the VRS. The cleaned air stream is then vented to the atmosphere through a stack. A continuous process monitor (CPM) is provided to measure and record total hydrocarbons in the stack exhaust. The VRS induced draft stack fan is expected to provide a nominal 700 acfm of vapor flow.

2.1.3 Condensate

The condensate slurry collected in the quencher/scrubber system is pumped from the WESP to the condensate storage tank(s). Condensate transfer pumps convey the slurry to the water treatment plant .

2.2 PERFORMANCE RE-TEST IMPLEMENTATION SUMMARY

POP re-testing was conducted on CTDU #2, since unit #1 had already been tested during the original POP test. There is uniformity between the two continuous systems, therefore POP re-testing for one system was considered appropriate. Three replicate re-tests were conducted. Prior to any treatment of contaminated soil, a pre-operational checklist was filled out to confirm that all pre-operational activities had been completed. A copy of this checklist is included in Appendix A.

2.2.1 Thermal Desorption System Shakedown

The purpose of the system shakedown was to verify mechanical operation of the thermal desorption system at elevated feed rates. Prior to the re-tests, the CTDU processed contaminated soil for a approximately 12 hours (not continuous) up to 15 tph. This amount of time was the minimum needed to ensure that all mechanical components were functioning properly at the increased feed rate. Key information collected for the CTDU system shakedown included: retention time, soil feed rate, soil exit temperature, and material handling and VRS equipment performance.

Feed material was excavated from the former lagoon area in Pit 4 and stockpiled in the Pit 4 pole barn. Several attempts were made to locate soil with the correct level of contamination for the re-tests. For each attempt approximately 400 tons of soil was excavated and a composite sample was collected. For the first two attempts the soil did not contain high enough levels of contamination. The third attempt showed extremely high levels of contamination. This soil was screened and brought to the TDU pole barn area for the re-tests. After screening, another composite sample was collected, which showed acceptable levels of contamination. This soil was used for the first day of the re-test. The soil was mixed at a 1:1 ratio with less contaminated soil for the second and third re- tests.

2.2.2 POP Re-testing

POP re-testing began on CTDU #2 on the morning of April 13, 1999 at 0850 hours. Several mechanical problems occurred (e.g. a stable feed rate was not obtained and high FTO temperature fault occurred), which were addressed that day. The first re-test was completed that day. However there was a problem in the sampling train. A pale yellow/white fluid (later identified as naphthalene) condensed in the condenser of the sampling train, which reduced the airflow and prevented complete collection of semi-volatile organic compounds (SVOC) and dioxin/furan sample volumes at the inlet. The remainder of the samples from the first re-test (i.e. VOSTs at the inlet and VOSTs, SVOC and dioxin/furan at the outlet were collected between 1430 and 1858 hours. The second re-test was collected between 1656 and 2100 hours on 4/14/99. After meeting with EPA, MDE, and USACE, the stack sampling was modified to collect only VOST at the inlet and all the parameters at the outlet for all three tests. The third re-test began promptly at 0742 hours on April 15, 1999 and ran for four hours. All three POP re-tests were conducted at maximum throughput operating conditions. It was intended to run each test at a feed rate of 15 tph and with feed soil containing 10% moisture. This was based on the design throughput capacity of the equipment. However, it was not possible to attain this rate (on average) due to higher moisture content of the actual test feed soils. The average moisture contents were 11.05, 12.25 and 13.68. The average feed rate for each re-test was 14.35, 13.58 and 13.64 tph, respectively. See App C.

Soil, air, and condensate were sampled during the three POP re-tests. Samples were labeled and packaged following procedures outlined in Appendix N, SOPs 50.1, 50.2 and 50.3, and sent to an off-site laboratory for detailed analyses. Untreated and treated soil were also analyzed on-site for B(a)P equivalent concentration and percent moisture. In addition, critical process control data was monitored and recorded during each re-test and is presented in Appendix B.

ORIGINAL (Red)

3.0 PERFORMANCE RESULTS

3.1 PROCESS OPERATING PARAMETERS

Operating parameters were monitored to assure the efficient operation of system components and maintenance of operating conditions. Table 3-1 identifies the parameter, instrument, acceptance range (which may have been adjusted based on data obtained during the POP re-tests), frequency, range and accuracy of equipment, and calibration for the continuous thermal desorption system. These tables also indicate which parameters are recorded. The values for these parameters were stored in a computer during the POP re-tests.

Summaries of the values recorded for each parameter for the continuous re-tests, including explanations of anomalies or adjustments, are presented in Appendix B, Table B-1. Actual real-time computer printouts of this data are also included in Appendix B. Parameters measured during stack sampling, including temperature, flow rate and percent moisture, are presented in Appendix G, Table G-3.

Actual values for each operating parameter and the total hydrocarbon analyzers during the POP re-tests were continuously monitored by the operators. If the operating parameters drifted beyond the allowable limits during the POP re-tests, the operator made the necessary adjustments to allow the system to operate within normal parameters. In addition to the operating parameters shown on Table 3-1, the total hydrocarbon analyzer in the stacks' continuous process monitoring systems was checked for calibration each day.

In order to ensure that air emission limits will not be exceeded during full-scale operations, a correlation was made between stack emission rates and CPM readings obtained using results from the original POP tests. From this information, a maximum allowable CPM reading for total hydrocarbons was calculated (including a safety margin) for each continuous unit stack (800 ppm). This maximum was not recalculated based on re-test results, because conservative assumptions were used in the original calculation and based on operations this limit has been a good indicator of mechanical problems. During full-scale operations, continuous monitoring of the THC levels in stack emissions will provide indirect confirmation that air emission standards continue to be met.

3.2 FEED CHARACTERISTICS

Contaminated soil from Pit #4 was considered to be representative of the worst-case contamination that will be encountered at the site and was used as feed material to evaluate the CTDU. Chemical and physical analyses were performed on the untreated feed to assess feed characteristics, provide physical data for unit optimization and verify that it was representative of material to be treated in the units throughout the cleanup. Additionally, this information was used to evaluate handling methods and requirements before and after treatment.

Untreated feed material was sampled following procedures in Appendix N, SOP 30.7. For each stockpile, one grab VOC sample was collected from a random location directly into a sample jar. Stockpiles were also sampled and analyzed for percent moisture and PAHs/PCP/carbazole on-site. These samples were collected from ten locations in each stockpile and homogenized before being placed in the sampling containers. Ten random locations from each stockpile were selected so that representative soil types and contaminant concentrations were sampled. Samples were labeled and packaged following procedures outlined in Appendix N, SOPs 50.1, 50.2 and 50.3.

Stockpiles for the first, second and third re-tests for the continuous units contained high concentrations of PAHs with 35.1, 41.8, and 47.1 ppm on-site laboratory B(a)P equivalent concentrations, respectively. A value of zero was used for compounds not detected. Percent moistures of the feed soil for the

ORIGINAL (Red)

continuous unit were consistent (11.1, 12.3 and 13.7%), but greater than anticipated (approximately 10%). Untreated soil results are presented in Tables 3-2 to 3-4 (first, second and third continuous re-tests, respectively). All untreated soil samples contained low levels of VOCs.

3.3 AIR MONITORING

3.3.1 Stack Gases

During full-scale operation, there will be two stack discharge points from the thermal desorption processes. The two BTDUs will not operate while both continuous units are operating at the maximum feed rate and each CTDU will have a separate stack discharge point. The emission control equipment was designed based on the results of pilot scale testing on soil that contained typical levels of contamination. This design was oversized to handle variability in site soil conditions to ensure compliance with emission limits. Throughout all of the POP re-testing, airflow was periodically monitored with an FID after the FTO in the CTDU. FID outlet readings are presented in Appendix B under the tag name FTO/CPMS_LEVEL.

Samples for VOCs, SVOCs and dioxins/furans were collected at the outlet following procedures outlined in Appendix N, SOP 30.10 with the exception that final sample volume ranged from 0.5 to 20 liters. VOST method guidance documents suggest that no more than 5000 ng of organic be loaded on the VOST train. Varying sample volumes offered the flexibility of identifying and analyzing samples that met method limitation criterion. Inlet sample volumes were one 0.5L sample, two 1.0L samples and one 2.0L sample. Outlet sample volumes were one 5L sample, two 10L samples, and one 20L sample. Even though in the POP re-tests, range of sample volumes increased beyond what was stated in the SOP, it did not have any adverse impact on the validity or the analysis of the samples. Each sample volume yielded comparable results to the other sample volumes analyzed. Temperature, moisture and flow rates of the stack gases were also measured. Stack samples were also collected before the FTO (inlet) for the VOCs to determine the effectiveness of the oxidizer. SVOC and dioxin/furan samples could not be collected at the inlet of the FTO because naphthalene in the gas stream condensed and solidified in the sample collection train, thereby diminishing their suitability for analysis.

All samples were shipped to the laboratories for analysis. Originally, Triangle Laboratories, which is MRD certified, was contracted to conduct all air sample analysis. However, contrary to earlier assurances, Triangle was unable to conduct the required VOC analysis. Triangle proposed using their subcontrator, Data Analytical Technologies, which is both equipped and experienced in VOC analysis. In the interest of conducting the analysis within the method-required timeframe, it was agreed to proceed with Data Analytical Technologies. It was later determined that they were not MRD certified. — take this out or explain how it affects data

The regulations for stack emissions include standards for visible emissions, particulate matter, and toxic air pollutants (TAPs). TAPs include SVOCs, VOCs, and dioxin/furans. The MDE Air and Radiation Management Administration has established TAPs screening levels that provide an off-site, risk-based concentration for each TAP. The applicable Environmental Protection Agency (EPA) and State of Maryland regulations for stack emissions are presented in Appendix E.

In order to demonstrate that TAPs emissions were within regulated limits, air dispersion modeling and stack sampling and analysis were used. Through the air dispersion modeling using average flow rates and worst-case temperatures measured during the re-tests, allowable concentrations of each TAP emitted at the stack were established so that off-site concentrations would not exceed the risk-based TAPs screening level. A table of the Maryland TAPs screening levels, details of the air dispersion model (including input parameters) and resultant stack emission limits are presented in Appendix F.

For each TAP analyte, the mass measured during each POP re-test was compared to the allowable stack emission rate limit to ensure that the limit was not exceeded. Mass was converted to rate using sample volume and flow rate. For each dioxin/furan analysis, a 2,3,7,8-TCDD toxicity equivalent rate was calculated by multiplying the emission rates of dioxin/furan compounds by the corresponding toxicity equivalent (scaling) factors. A value of zero was used for analytes not detected. The sum of the scaled rates was then compared to the allowable emission rate limit.

Results are presented in Tables 3-5 to 3-7 (first, second and third continuous re-tests, respectively).

SVOCs - dioxins OK VOCs - OK

ORIGINAL (Red)

Emission rates for all three sets of data for the CTDU are well within standards, several orders of magnitude below, in most cases. FTO inlet concentrations for VOCs are generally below emission standards.

Temperature, flow rate and percent moisture readings collected during each re-test are presented in Table G-3. Calculations used to convert mass (laboratory reporting unit) to concentration or rate are presented in Appendix G.

Since the potential for both CTDUs to operate simultaneously exists, POP test emissions data was doubled and compared to the total facility emissions limits in Table 3-8. Emission rates are below stds for all collected chemicals.

3.3.2 Site Perimeter

Air was monitored at the perimeter of the site during each day of the POP re-tests to ensure that emissions from excavation and materials handling activities were at acceptable levels. Based on the types of contaminants found at the site, creosote and pentachlorophenol, the most likely sources of airborne contaminants resulting from remedial activities would be VOCs released from the soil directly into the air and SVOCs adsorbed to particulate matter that might become airborne. Therefore, the perimeter air-monitoring program was designed to address these two possible off-site emissions sources and included monitoring for VOCs and particulate matter.

A meteorological survey, presented in Appendix I, was used to design the air-monitoring network to take into account local wind patterns. Wind direction was checked immediately before monitoring activities and when major weather fronts occurred. Because topographic relief across the site is approximately 35 feet, three windsocks were placed on-site to ensure a representative measurement of wind direction was obtained. Additional meteorological information (i.e., wind speed, wind direction, temperature, barometric pressure and relative humidity) was obtained from an on-site weather station prior to monitoring activities. One upgradient and three downgradient sample locations were established each day of monitoring based on the observed wind direction. The fifteen potential air-monitoring locations are presented in Figure 3-1.

Perimeter air monitoring measurements for VOCs and particulates were compared to human health risk-based action levels developed by the EPA. The risk-based concentrations (RBC) were adjusted to a 2 year exposure for a child (the most sensitive population that could be affected by activities at the site). The RBC calculations, including the input parameters, are presented in Appendix J.

3.3.2.1 VOCs

VOC monitoring was conducted on a time-weighted basis using summa canisters. During each day of monitoring, VOC samples were collected at each sampling location following the procedures outlined in Appendix N, SOP 30.6, with the exception that the first two tests were collected over a four hour period instead of eight to coincide with the POP re-tests. For VOCs, the RBC was the action level. Benzene was selected as the preliminary target compound because of its volatility and toxicity relative to other VOCs present at the site. The action level for benzene is 1.57 µg/m^3 (0.5 ppbv). Calculations used to convert units of ppbv to µg/m^3 are located in Appendix K. Initial sampling and analysis included all VOCs to determine if benzene is the appropriate target compound. If necessary, a new target compound will be selected and an action level developed.

During the three days of POP re-testing, benzene was not detected at or above the action limit in any of the 12 samples (3 days x 4 locations) except the upwind sample collected on 4/15/99 which was slightly above the action level (0.56ppbv). Low concentrations of other VOCs were detected and all results are listed in Table 3-9 for POP re-tests.

3.3.2.2 Particulates

Particulate monitoring targeted the respirable dust fraction (i.e. particles less than 10 microns in size) of total dust generated. During each day of monitoring, particulates were monitored at each sampling location using a dust monitor three times per day and a time-weighted average was read at the end of the day following the procedures outlined in Appendix N, SOP 30.5 with the exception that the first two tests were collected over a four hour period to coincide with the POP re-tests and particulate monitoring was discontinued after three hours during the third re-test due to rain (no time-weighted average collected). For particulates, the RBC was used in combination with an evaluation of soil contaminant concentrations to develop the action level. Benzo(a)pyrene was selected as the target compound because it is the most toxic semi-volatile present on-site and found in the highest concentrations relative to other SVOCs. The action level (2.75 mg soil/m^3 air) was developed by dividing the RBC of benzo(a)pyrene (0.01 μg/m^3) by the 95% upper confidence level (UCL) of benzo(a)pyrene concentration in the containment area (3,640 μg/kg soil). This approach is very conservative in that it assumes that all the particulates identified in the monitoring device contain this high concentration of benzo(a)pyrene. Appendix L describes the methodology used to determine the 95% UCL. Readings for particulate air monitoring are included in Table 3-10. There were no particulate levels measured (including the time-weighted averages) above the action level of 2.75 mg/m^3.

ORIGINAL (Red)

3.4 TREATED MATERIAL

3.4.1 Treated Soil

The purpose of sampling treated soil was to demonstrate the ability of the CTDU to treat soil to meet the performance standards listed below.

- B(a)P equivalent concentration: surface soil < 0.1 mg/kg; subsurface soil < 1.0 mg/kg;
- Pentachlorophenol concentration: surface soil < 5.0 mg/kg; subsurface soil < 1.7 mg/kg;
- Delisting criteria and Hazardous Waste Characteristics (TCLP metals, TCLP PAHs and TCLP SVOCs extrapolated from total SVOCs).

For each POP re-test, the conveyor deposited treated material creating five stockpiles. Wastewater discharge from the TDUs was treated by the on-site water treatment plant (WTP) and used to cool and re-hydrate the treated soil. Soil sampling for compliance with the soil performance standards was conducted after the treated process water was added to the soil.

Treated soil was sampled following procedures in Appendix N, SOP 30.7. For each POP re-test, samples were collected from ten random locations (two in each stockpile) and homogenized before being placed in the appropriate sampling container. One additional composite sample was collected and analyzed on-site for PAHs, carbazole, pentachlorophenol and percent moisture. This analysis was used to give an indication of whether the treated soil was expected to meet performance standards. Samples were labeled and packaged following procedures outlined in Appendix N, SOPs 50.1, 50.2 and 50.3. Samples were analyzed for PAHs, SVOCs, TCLP-metals and TCLP-PAHs.

To calculate B(a)P equivalent concentrations, eight compounds are used. The concentration obtained from laboratory analysis for each compound is multiplied by a scaling factor to obtain a scaled concentration. The eight compounds and their scaling factors are shown in Table 3-14. If the sum of the eight scaled concentrations exceeds 0.1 mg/kg, then the action level is exceeded for surface soil. If the sum of the eight scaled concentrations exceeds 1.0 mg/kg, then the action level is exceeded for subsurface soil.

B(a)P equivalent concentrations were calculated from analytical results using one half the reporting limit for compounds not detected. Results are presented in Tables 3-11 to 3-13 (first, second and third re-tests, respectively). On-site results contained B(a)P equivalent concentrations of 832, 689 and 2,269 ug/kg (first, second and third re-tests, respectively). These results indicated that soil from the first and second re-tests met subsurface performance standards (less than 1.0 mg/kg), but that soil from the third test exceeded the least stringent criteria. Off-site results confirmed that treated soil from the second re-test contained PAHs and carbazole in concentrations which resulted in B(a)P equivalent concentrations less than subsurface criteria and that treated soil from the third re-test exceeded criteria. Off-site results for treated soil from the first re-test were higher than on-site and indicated that this soil exceeded subsurface criteria. 8k

Pentachlorophenol (total) was not detected in any of the samples (on-site or off-site results), although the off-site reporting limit was raised (due to necessary dilutions for high concentrations of fluoranthene and phenanthrene also detected by the SVOC method) above the criteria for samples from the second and third tests. Treated soil met all delisting and hazardous waste characterization criteria except that the reporting limit for TCLP-pentachlorophenol was raised (due to necessary dilutions for high concentrations of fluoranthene and phenanthrene also detected by the SVOC method) above the criteria for samples from the second and third tests. TCLP values for SVOCs were calculated for each analyte by dividing the concentration obtained from the total SVOC analysis by the leachate procedure dilution factor, 20 (SW846 Method 1311, Section 7.2.11 and 7.3). This is a conservative estimate in that it assumes complete desorption of the analyte from the soil to the leachate.

ORIGINAL (Red)

During full-scale operations, treated soil may be back-filled on-site once testing has confirmed that the soil has met performance standards.

3.4.2 Hot Cyclone

Grab samples were collected from the sample port located at the bottom of the hot cyclone in the continuous system during the POP re-tests for soil performance criteria. Samples were labeled and packaged following procedures outlined in Appendix N, SOPs 50.1, 50.2 and 50.3. Samples were analyzed for the same parameters as treated soil. Results are presented in Tables 3-15 to 3-17 (first, second and third re-tests, respectively).

All three continuous re-tests met hazardous waste characteristics and delisting criteria except that the reporting limit for TCLP-pentachlorophenol for samples from all three re-tests, TCLP-carbazole for the sample from the first re-test and 2,4 dinitrotoluene and hexachlorobenzene for samples from the first and second re-tests were raised above the criteria (due to necessary dilutions for high concentrations of fluoranthene and phenanthrene also detected by the SVOC method). Also the value for TCLP-dibenzo(a,h)anthracene for samples from the second re-test was at the criteria of 0.10 ug/L.

In calculating B(a)P equivalent concentrations for the hot cyclone dust from the continuous units, one half of the reporting limit was used for compounds not detected. The first and second re-tests exceeded the performance standards for B(a)P equivalent concentration subsurface soil (12,275 and 3,487 ug/kg, respectively). The third re-test contained a B(a)P equivalent concentration of 326 ug/kg. This met the B(a)P performance standard for subsurface soil but was above the criteria for surface soil. Pentachlorophenol (total) was not detected in any of the samples, although the reporting limit was raised (due to necessary dilutions for high concentrations of fluoranthene and phenanthrene also detected by the SVOC method) above the criteria for samples from the first and second re-tests.

Hot cyclone dust is a very small portion of the treated soil, and during full scale operations, feed soil will be less contaminated than soil used for the POP re-test. Therefore, it is recommended to continue the current practice of blending hot cyclone dust in with treated soil.

3.5 WASTEWATER AND TREATED EFFLUENT

Process wastewater was generated from the TDU condensers, air scrubbers, and WESPs. Process wastewater was routed to two, approximately 10,000-gallon, vertical tanks located at the TDU area. From there, water was transferred to an approximately 8,000-gallon mud tank and then to an approximately 20,000-gallon horizontal tank (T-112) at the WTP. Process wastewater was treated by the WTP for re-use by the thermal desorption systems. In order to discharge treated water to the Western Tributary, analyses must show that effluent meets the standards established by the MDE.

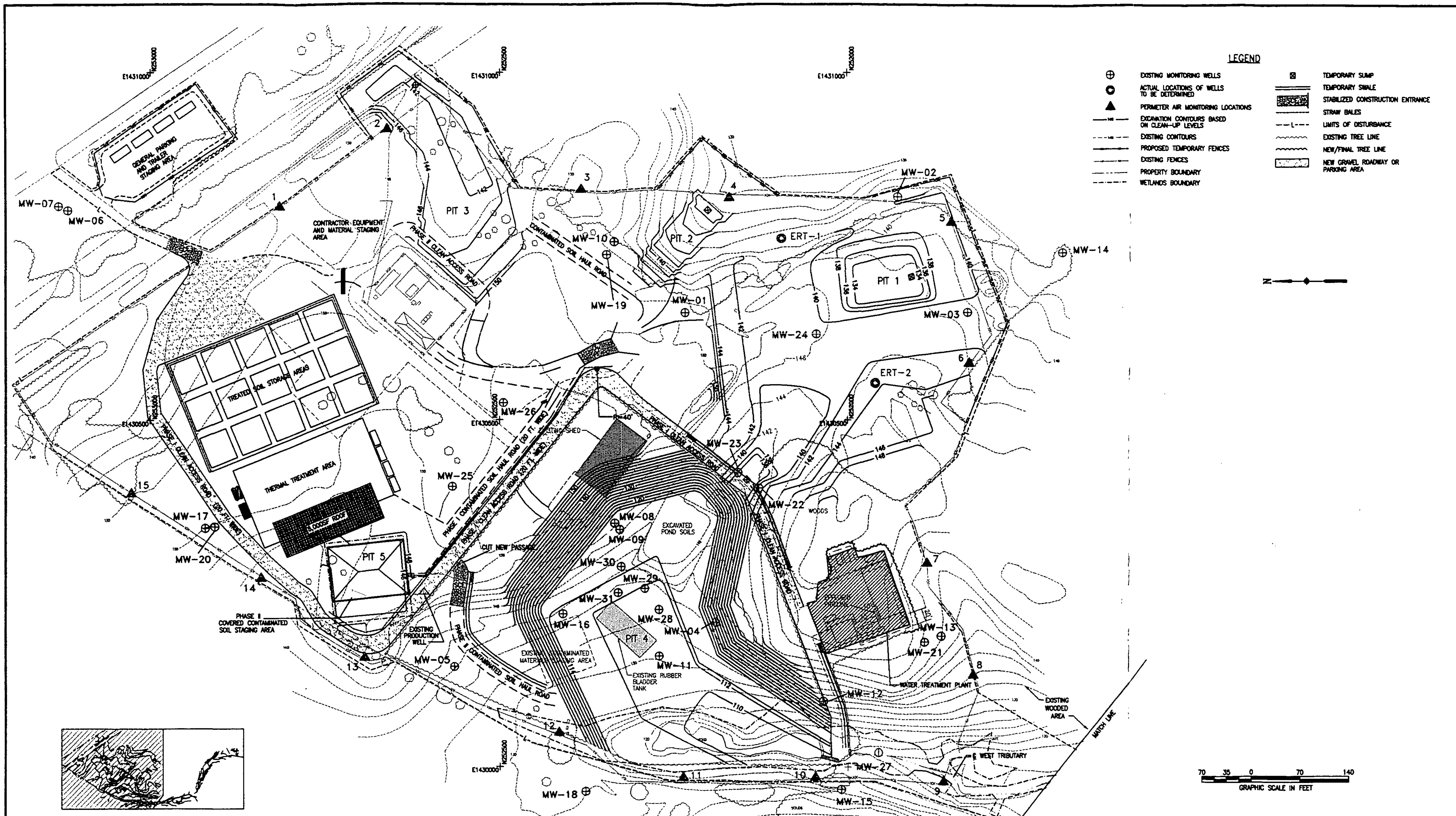
In order to evaluate system performance and the ability of the plant to achieve the requirements of the discharge during the proof of performance, a monthly WTP sampling event was conducted during the second re-test (4/14/99) in accordance with Appendix N, SOP 30.9. Samples were labeled and packaged following procedures outlined in Appendix N, SOPs 50.1, 50.2 and 50.3.

Table 3-18 presents results from WTP sampling and analysis. Temperature was not taken. The influent to the WTP contained high concentrations of cyanide, phenolic compounds and PAHs, VOCs, iron, TPH-GRO and DRO, TSS, and a DO concentration below minimum criteria.

Results show exceedences of the discharge standards. Parameters in exceedence in the effluent included phenol, selenium, cyanide, ammonia, BOD and TKN. Phenol was detected after the secondary carbon unit above the average discharge criteria, but below the maximum discharge criteria. Selenium was detected above the average discharge criteria but below the maximum.

ORIGINAL (Red)

Analytical results confirm that ammonia accounts for at least 80% of the TKN in the condensate, and it is suspected that the majority of the BOD is also ammonia related. At this time, there is no treatment in the plant for ammonia. This problem is not new, and several solutions have been considered, but none appear to be cost effective. They are biotreatment, air stripping and hydroxyl radical treatment. Biotreatment was investigated and discarded due to the inability of the plant to handle the expected increase in sludge generation. Air stripping was evaluated and discarded because of the poor efficiency of ammonia strippers and the resulting high capital and operating cost. Hydroxyl radical treatment involves similar destruction approach to AOP treatment, and is predicted to have limited effectiveness, although it is still being considered for both cyanide and phenol reduction. Given this, there are no plans for the treatment of ammonia. Effluent will only be used for soil re-wetting and recirculation to the VRS system of the TDUs and not discharged to the West Tributary. Vendors are being contacted in order to determine if a different resin exists which would have the potential of higher phenol adsorptive capacity than carbon.



U.S. ARMY ENGINEER DISTRICT, BALTIMORE
CORPS OF ENGINEERS
BALTIMORE, MARYLAND

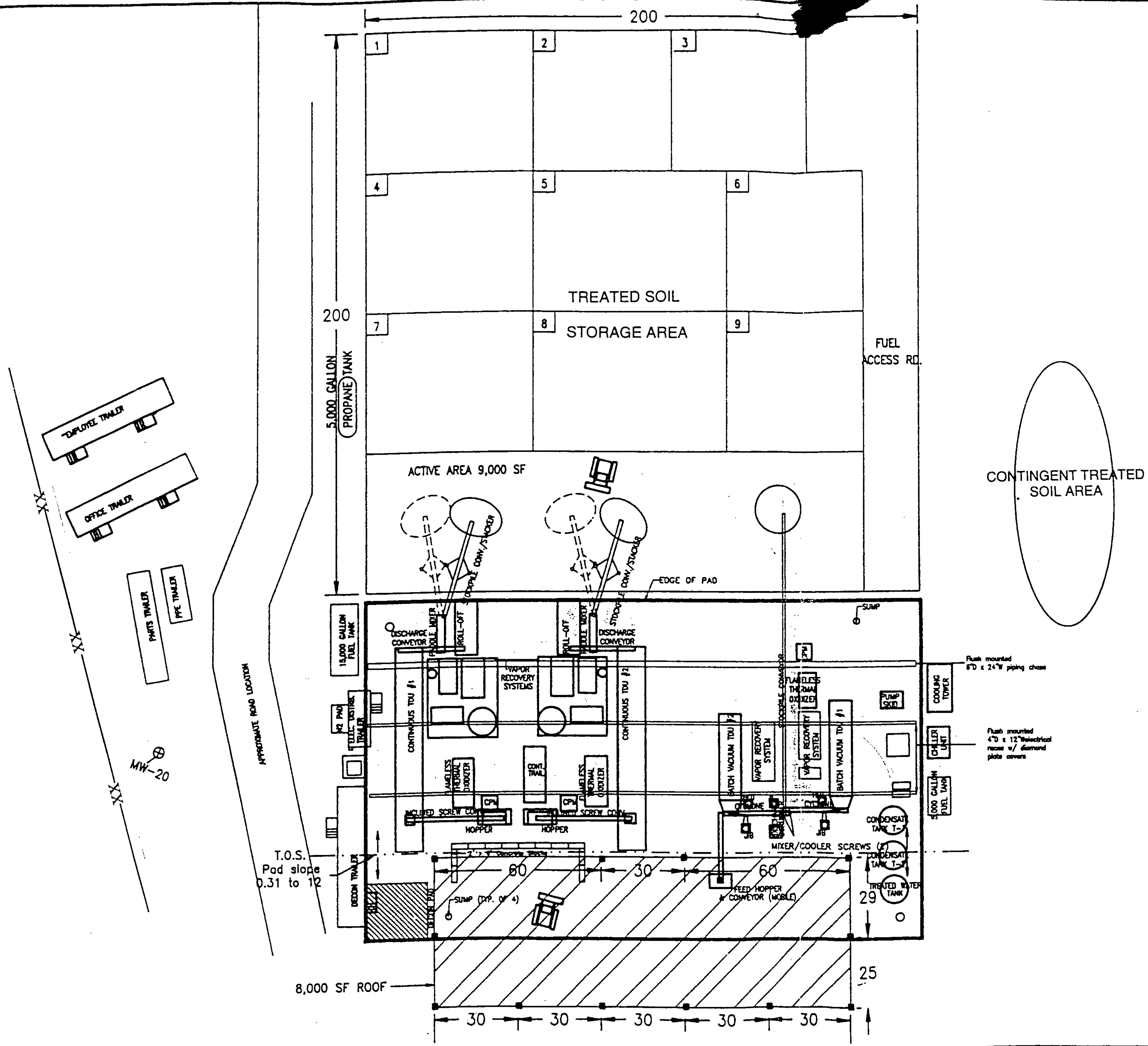
ICF KAISER
2113 Emmorton Park Drive
Suite 100
Edgewood, Maryland 21040
(410) 612-6350

PREPARED BY:	PMH	TASK NO:	66716
CHECKED: S. SALAN		ICF DWG NO:	NEWWELLa
DATE:	8-28-98		

FIGURE 3-1

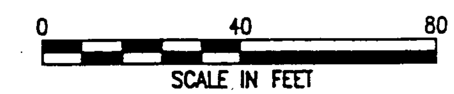
SITE PLAN SHOWING AIR MONITORING LOCATIONS

SOUTHERN MARYLAND WOOD TREATMENT SITE
HOLLYWOOD, MARYLAND



LIST OF ACRONYMS

CPM	Continuous Process Monitor
DCV	Differential Control Valve
FCV	Flow Control Valve
FD	Forced Draft
FT	Flow Transmitter
FTO	Flameless Thermal Oxidizer
HCV	Hand Control Valve
LCV	Level Control Valve
M	Motor Control Valve
OA	Oxygen Analyzer
PCV	Pressure Control Valve
PI	Pressure Gauge
PT	Pressure Transmitter
S	Solenoid Valve
SP	Sample Point
TDU	Thermal Desorption Unit
TI	Temperature Gauge
TT	Temperature Transmitter
VRS	Vapor Recovery System
WESP	Wet Electrostatic Precipitator



TDU PROCESS AREA LAYOUT
FIGURE 2-1

ETG ENVIRONMENTAL, INC.
16 Hagerty Blvd., West Chester PA 19382•(610)431-9100

SOUTHERN MARYLAND WOOD TREATMENT SITE
HOLLYWOOD, MD

DATE: 4/15/98	FILE NAME: DWG\4800\ASBUILT	REV 2
Scale as shown	Drawn by: MR	Sheet FIGURE 2-1

ORIGINAL (Red)

Table 1-1
SUMMARY OF POP RE-TESTS

	Carcinogenic PAHs	B(a)P equivalents	Pentachloro-phenol	2,3,7,8 TCDD equivalents	Total SVOCs	Total VOCs	Met Criteria?
FIRST TEST							
untreated soil (ug/kg)	244,100	35,100	48,000	NA	NA	NA	
treated soil (ug/kg)	8,483	1,206	ND	NA	NA	NA	No
hot cyclone (ug/kg)	89,920	12,275	ND	NA	NA	NA	No
FTO inlet (g/s)	NA	NA	NA	NA	NA	0.466	
FTO outlet (g/s)	NA	NA	ND	1.95E-10	0.011	0.00868	yes?
SECOND TEST							
untreated soil (ug/kg)	370,200	41,800	24,000	NA	NA	NA	
treated soil (ug/kg)	5,380	797	ND	NA	NA	NA	Yes*
hot cyclone (ug/kg)	25,350	3,487	ND	NA	NA	NA	No
FTO inlet (g/s)	NA	NA	NA	NA	NA	0.635	
FTO outlet (g/s)	NA	NA	ND	1.16E-10	0.015	0.00856	yes?
THIRD TEST							
untreated soil (ug/kg)	422,100	47,100	66,000	NA	NA	NA	
treated soil (ug/kg)	14,430	2,290	ND	NA	NA	NA	No
hot cyclone (ug/kg)	4,433	326	ND	NA	NA	NA	Yes*
FTO inlet (g/s)	NA	NA	NA	NA	NA	0.986	
FTO outlet (g/s)	NA	NA	ND	7.26E-11	0.0105	0.0118	yes?

*Subsurface only

- cleanup criteria must be included for soil, hot cyclone
- no comments about air or FTO outlet

Criteria for treated soil, hot cyclone

	Surface	Subsurface
B(a)P	100 µg/kg	1000 µg/kg
PCP	5000 µg/kg	1700 µg/kg

detection levels
TC

add % moisture

Table 3-1 Summary of Operational Parameter Instrumentation for Continuous Thermal Desorption Units

#	Parameter	Instrument	Accept. Range/ Maximum	Range of Test Data*	Frequency	Range and Accuracy of Equipment	Calibration	Recorded (Yes/No)
1	Soil Feed Rate	Variable Speed Screw Feeder	15.3 TPH maximum	13.58 to 14.35 TPH	Continuous	0-60 tph ±5% per 24 hr. period	Vol. measurement converted to tons on calibration curve	Yes
2	Thermal Desorber Face Pressure	Pressure Transmitter	0.25 to -2.0"	-0.48 to 0.09"	Continuous	-10" to 15" w.c. ±0.25% of full scale	Factory calibrated	Yes
3	Thermal Desorber Shell Temperature	Thermocouples	1000 to 1650°F	1367 to 1613°F	Continuous	0-2,200°F±4°F (0-559°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
4	Soil Exit Temperature	Thermocouples	875 to 1050°F, not < 850°F for 20 min.	864 to 1113°F*	Continuous	0-2,200°F±4°F (0-559°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
5	Hot Cyclone Temperature	Thermocouples	750 to 1050°F	846 to 982°F	Continuous	0-2,200°F±4°F (0-559°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
6	Scrubber Outlet O_2 Level	O_2 Level Analyzer	1 to 10%	5 to 22%*	Continuous	0-100% O2 +/- 0.1% O2	Automatically Checked Daily	Yes
7	Scrubber Recycle Water Temperature	Thermocouple	50 to 135°F 24-hr average 150°F maximum	118 to 138°F	Continuous	0-2,200°F±4°F (0-559°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
8	Cooling Tower Outlet Water Temperature	Thermocouple	50 to 120°F	94 to 104°F	Continuous	0-2,200°F±4°F (0-559°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
9	WESP Gas Exit Temperature	Thermocouple	50 to 135°F 24-hr average 150°F maximum	106 to 161°F	Continuous	0-2,200°F±4°F (0-55°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
10	FTO Bed Temperature	Thermocouple	1500 to 1800°F	1565 to 1802°F	Continuous	0-2,200°F±4°F (0-559°F) ±0.75% (559-2,200°F)	Factory calibrated	Yes
11	CPM THC Level	FID Analyzer	800 ppm maximum	-53.2 to 472.4 ppm*	Continuous	3-10,000 PPM <1% of full span in 24 hours	Timed Automatic Calibration Check	Yes

*Exceedences explained in Table B-1

ORIGINAL (Red)

ORIGINAL (Red)

TABLE 3-2– Untreated Soil
First Continuous Test, 4/13/99

SVOCs by 8270 (on-site)	Result (mg/kg)	Reporting Limit (mg/kg)
Benzo[a]anthracene	56	24
Benzo[b]fluoranthene	26	24
Benzo[k]fluoranthene	27	24
Benzo[a]pyrene	23J	24
Chrysene	50	24
Dibenzo[a,h]anthracene	2.7J	24
Indeno[1,2,3-cd]pyrene	7.4J	24
Carbazole	52	24
Benzo(a)Pyrene Equivalence	35.1 mg/kg (ND=0)	
Total Carcinogenic PAHs	244.1 mg/kg	
Acenaphthene	210	24
Acenaphthylene	8.4J	24
Anthracene	94	24
Fluoranthene	300	24
Fluorene	180	24
Naphthalene	500	24
Phenanthrene	510	24
Pyrene	180	24
Total PAHs	2,174.5 mg/kg	
Pentachlorophenol	48	24
Percent Moisture (on-site)	10%	
VOCs by 8260	Result (ug/kg)	Reporting Limit (ug/kg)
Benzene	ND	29
Chloroform	ND	29
Methylene Chloride	58	29
Ethylbenzene	380L	29
Styrene	490	29
Toluene	320L	29
Xylene(s)	1,400L	87

[illegible] carbazole

A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-3– Untreated Soil
Second Continuous Test, 4/14/99

SVOCs by 8270 (on-site)	Result (mg/kg)	Reporting Limit (mg/kg)
Benzo[a]anthracene	90	48
Benzo[b]fluoranthene	36J	48
Benzo[k]fluoranthene	33J	48
Benzo[a]pyrene	28J	48
Chrysene	78	48
Dibenzo[a,h]anthracene	ND	48
Indeno[1,2,3-cd]pyrene	5.2J	48
Carbazole	100	48
Benzo(a)Pyrene Equivalence	41.8 mg/kg (ND=0)	
Total Carcinogenic PAHs	370.2 mg/kg	
Acenaphthene	300	48
Acenaphthylene	19J	48
Anthracene	200	48
Fluoranthene	360	48
Fluorene	240	48
Naphthalene	450	48
Phenanthrene	640	48
Pyrene	320	48
Total PAHs	2,799.2 mg/kg	
Pentachlorophenol	24J	48
Percent Moisture (on-site)	12%	
VOCs by 8260	Result (ug/kg)	Reporting Limit (ug/kg)
Benzene	ND	27
Chloroform	ND	27
Methylene Chloride	50	27
Ethylbenzene	130L	27
Styrene	190	27
Toluene	86L	27
Xylene(s)	440L	81

doesn't include carbazole

A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-4– Untreated Soil Third Continuous Test, 4/15/99

SVOCs by 8270 (on-site)	Result (mg/kg)	Reporting Limit (mg/kg)
Benzo[a]anthracene	98	48
Benzo[b]fluoranthene	48	48
Benzo[k]fluoranthene	39J	48
Benzo[a]pyrene	31J	48
Chrysene	89	48
Dibenzo[a,h]anthracene	ND	48
Indeno[1,2,3-cd]pyrene	7.1J	48
Carbazole	110	48
Benzo(a)Pyrene Equivalence	47.1 mg/kg (ND = 0)	
Total Carcinogenic PAHs	422.1 mg/kg	
Acenaphthene	310	48
Acenaphthylene	24J	48
Anthracene	190	48
Fluoranthene	430	48
Fluorene	280	48
Naphthalene	550	48
Phenanthrene	740	48
Pyrene	270	48
Total PAHs	3,106.1 mg/kg	
Pentachlorophenol	66	48
Percent Moisture (on-site)	11%	
VOCs by 8260	Result (ug/kg)	Reporting Limit (ug/kg)
Benzene	ND	58
Chloroform	ND	58
Methylene Chloride	ND	58
Ethylbenzene	550	58
Styrene	330	58
Toluene	110	58
Xylene(s)	890	174

– doesn't include carbazole

A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-5 Stack Gases
First Continuous Re-Test 4/13/99

VOCs	Inlet Result (g/s)		Reporting Limit (g/s)	Outlet Result (g/s)		Reporting Limit (g/s)	Regulatory Level (g/s) 1-Hour	8-Hour	Annual
1,1,1,2-Tetrachloroethane	ND		2.59E-04	ND		8.80E-06		1.58E-02	
1,1,1-Trichloroethane	ND		2.59E-04	2.03E-05		8.80E-06	9.90E+00	1.10E+01	
1,1,2,2-Tetrachloroethane*	1.92E-04	R	2.59E-04	ND	R	8.80E-06		3.97E-02	
1,1,2-Trichloroethane	1.38E-03		2.59E-04	6.08E-05		8.80E-06		3.16E-01	
1,1-Dichloroethane	2.06E-04		2.59E-04	2.21E-04		8.80E-06		2.30E-01	2.01E-03
1,1-Dichloroethene	2.40E-04		2.59E-04	1.59E-04		8.80E-06	3.18E-01	1.15E-01	
1,1-Dichloropropene	1.39E-04		2.59E-04	ND		8.80E-06		2.59E-02	2.01E-03
1,2,3-Trichlorobenzene*	1.71E-04	R	2.59E-04	ND	R	8.80E-06		4.37E-02	
1,2,3-Trichloropropane*	ND	R	2.59E-04	ND	R	8.80E-06		3.45E-01	
1,2,4-Trichlorobenzene*	2.15E-04	R	2.59E-04	5.58E-06	R	8.80E-06		2.13E-01	
1,2,4-Trimethylbenzene*	1.99E-03	R	2.59E-04	8.22E-05	R	8.80E-06		1.21E-01	
1,2-Dibromo-3-chloropropane*	ND	R	2.59E-04	ND	R	8.80E-06		5.58E-03	7.35E-02
1,2-Dibromoethane	2.00E-04		2.59E-04	3.74E-06		8.80E-06		8.22E-01	2.52E-04
1,2-Dichlorobenzene*	1.07E-04	R	2.59E-04	3.96E-06	R	8.80E-06	1.21E+00	8.63E-01	
1,2-Dichloropropane	ND		2.59E-04	ND		8.80E-06	2.05E+00	2.00E+00	
1,2-Dichloropropane	ND		2.59E-04	ND		8.80E-06	2.05E+00	2.00E+00	
1,3,5-Trimethylbenzene*	2.30E-03	R	2.59E-04	7.64E-05	R	8.80E-06		1.38E+00	
1,3-Butadiene*	3.11E-01	J	2.59E-04	2.24E-03	J	8.80E-06		2.53E-02	2.01E-03
1,3-Dichlorobenzene*	1.16E-04	R	2.59E-04	4.26E-06	R	8.80E-06		4.03E-01	
1,3-Dichloropropane	1.90E-04		2.59E-04	2.90E-06		8.80E-06		2.01E-01	
1,4-Dichlorobenzene*	1.05E-04	R	2.59E-04	3.16E-05	R	8.80E-06		3.45E-01	7.35E-03
2,2-Dichloropropane	ND		2.59E-04	ND		8.80E-06			
2-Chlorotoluene*	6.98E-04	R	2.59E-04	1.93E-05	R	8.80E-06		2.76E+00	
4-Chlorotoluene*	1.78E-04	R	2.59E-04	6.78E-06	R	8.80E-06		1.96E+00	
Acrylonitrile	1.25E-03		2.59E-04	9.04E-05		8.80E-06		2.47E-02	8.05E-04
Benzene	5.75E-02	J	2.59E-04	1.03E-03	J	8.80E-06	3.22E-02	9.20E-03	6.09E-03
Bromobenzene*	1.76E-04	R	2.59E-04	ND	R	8.80E-06		1.17E+00	
Bromochloromethane	ND		2.59E-04	ND		8.80E-06		6.10E+00	
Bromoform*	ND	R	2.59E-04	ND	R	8.80E-06		2.99E-02	
Bromomethane	ND		2.59E-04	ND		8.80E-06		2.24E-02	
Carbon disulfide	1.32E-03		2.59E-04	8.47E-05		8.80E-06		1.78E-01	
Carbon tetrachloride	ND		2.59E-04	ND		8.80E-06		1.78E-04	
Chlorobenzene*	2.40E-04	R	2.59E-04	ND	R	8.80E-06		2.65E-01	
Chloroethane	2.87E-04		2.59E-04	ND		8.80E-06	5.23E-03	1.50E-03	
Chloroform	5.26E-04		2.59E-04	1.83E-05	J	8.80E-06		2.82E-04	
Chloromethane*	1.89E-02	J	2.59E-04	1.72E-04	J	8.80E-06	2.11E-01	6.04E-02	
cis-1,2-Dichloroethene	ND		2.59E-04	1.88E-05		8.80E-06		4.56E+00	
cis-1,3-Dichloropropene	ND		2.59E-04	ND		8.80E-06		2.59E-02	1.36E-03
Dibromochloromethane	ND		2.59E-04	ND		8.80E-06		2.00E-02	
Dibromomethane	ND		2.59E-04	ND		8.80E-06		8.18E-01	
Dichlorodifluoromethane*	2.46E-04	J	2.59E-04	1.69E-05	J	8.80E-06		2.85E+01	
Ethylbenzene*	3.28E-03	R	2.59E-04	7.11E-05	R	8.80E-06	2.19E+00	2.50E+00	
Hexachlorobutadiene*	ND	R	2.59E-04	ND	R	8.80E-06		1.21E-03	
Isopropyl benzene*	3.96E-04	R	2.59E-04	1.10E-05	R	8.80E-06		1.41E+00	
m/p-Xylene*	8.45E-03	R	2.59E-04	1.92E-04	R	8.80E-06	2.62E+00	2.50E+00	
Methylene chloride	2.33E-03		2.59E-04	1.65E-04		8.80E-06		1.00E-03	
Naphthalene*	7.56E-03	R	2.59E-04	2.72E-03	R	8.80E-06	3.18E-01	2.99E-01	
n-Butylbenzene*	5.01E-04	R	2.59E-04	2.83E-05	R	8.80E-06		2.03E-01	
n-Propylbenzene*	2.28E-03	R	2.59E-04	5.56E-05	R	8.80E-06		1.84E+01	
o-Xylene*	3.02E-03	R	2.59E-04	6.89E-05	R	8.80E-06	2.62E+00	2.50E+00	
p-Isopropyltoluene*	8.12E-04	R	2.59E-04	3.62E-05	R	8.80E-06		1.12E-01	
sec-Butylbenzene*	1.40E-04	R	2.59E-04	3.75E-06	R	8.80E-06		1.04E-01	
Styrene*	1.03E-02	R	2.59E-04	2.63E-04	R	8.80E-06	6.84E-01	4.89E-01	
tert-Butylbenzene*	1.66E-04	R	2.59E-04	3.76E-06	R	8.80E-06		2.05E-01	
Tetrachloroethylene	ND		2.59E-04	ND		8.80E-06	2.76E+00	9.78E-01	
Toluene	2.65E-02		2.59E-04	5.60E-04	J	8.80E-06		1.08E+00	
trans-1,2-Dichloroethene	2.23E-04		2.59E-04	1.02E-05	J	8.80E-06		4.56E+00	
trans-1,3-Dichloropropene	ND		2.59E-04	ND		8.80E-06		2.59E-02	1.36E-03
Trichloroethene	2.37E-04		2.59E-04	4.59E-05	J	8.80E-06	2.16E+00	1.55E+00	
Trichlorofluoromethane*	ND		2.59E-04	3.43E-05		8.80E-06	2.26E+01		
Vinyl chloride*	2.25E-04	J	2.59E-04	4.36E-05	J	8.80E-06		7.48E-02	5.89E-04

no reg level

*analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.
A key to data flags is included in Appendix M.

there's no "R" in App M
rejected

many analytes were detected in original POP but in new POP it says not usable because not appropriate for VOST sampling?

— is detectable ±1
✓ in original POP (others not on list)

TABLE 3-5 Stack Gases
First Continuous Re-Test- 4/13/99
(Continued)

ORIGINAL (Red)

Parameter	Outlet Result (g/s)	Reporting Limit (g/s)	Regulatory Level (g/s)		
SVOCs			1-Hour	8-Hour	Annual
Dibenzofuran	5.37E-4J	1.03E-5			
Diethylphthalate	8.27E-7J	8.69E-7		2.88E-2	
Fluorene	1.35E-4	1.06E-6		1.15E-3	
Pentachlorophenol	ND	8.60E-6		2.88E-3	
Phenanthrene	8.63E-4	1.18E-5		5.64E-3	
Anthracene	1.33E-4	1.26E-6		1.15E-3	
Di-n-butylphthalate	ND	7.86E-7			
Fluoranthene	3.21E-4	1.11E-6		4.72E-2	
Carbazole	1.32E-5J	1.57E-6		3.22E-3	
Pyrene	1.46E-4	1.07E-6		1.15E-3	
bis(2-Ethylhexyl)phthalate	5.62E-6J	1.38E-6		1.16E-1	
Benzo(a)anthracene	2.59E-5J	1.29E-6			2.89E-4
Chrysene	2.95E-5	1.78E-6		1.15E-3	
Benzo(b)fluoranthene	1.09E-5J	1.53E-6	8.31E-2		2.89E-4
Benzo(k)fluoranthene	1.56E-6J	1.38E-6			2.89E-4
Benzo(a)pyrene	2.28E-6J	1.87E-6		1.15E-3	2.41E-5
Indeno(1,2,3-cd)pyrene	ND	2.76E-6			2.89E-4
Dibenz(a,h)anthracene	ND	3.23E-6			2.89E-4
Phenol	4.92E-5	2.99E-6		1.09E-1	
1,2-Dichlorobenzene	ND	2.47E-6	1.21	8.63E-1	
2-Methylphenol	1.02E-5J	3.91E-6		1.27E-1	
3/4-Methylphenol	1.25E-5J	3.65E-6		1.27E-1	
Nitrobenzene	ND	2.83E-6		2.88E-2	
2,4-Dimethylphenol	3.29E-6	3.29E-6		7.55E-2	
Naphthalene	7.32E-3	3.87E-5	3.18E-1	2.99E-1	
2-Methylnaphthalene	9.57E-4	1.39E-5		3.85E-2	
Acenaphthylene	2.03E-4	8.82E-7		1.41E-02	
Acenaphthene	2.19E-4	1.33E-6		1.15E-3	
Dioxins					
Dioxin Equivalence	1.95E-10			1.15E-7	1.51E-9

no reg / mit

all SVOCs listed here are in table F-1
" " " " " " " 3-8 except NDs

A key to data flags is included in Appendix M.

TABLE 3-6 Stack Gases
Second Continuous Re-Test 4/13/99

ORIGINAL (Red)

	Inlet Result (g/s)		Reporting Limit (g/s)	Outlet Result (g/s)		Reporting Limit (g/s)	Regulatory Level (g/s)		
VOCs							1-Hour	8-Hour	Annual
1,1,1,2-Tetrachloroethane	ND		1.38E-04	ND		2.30E-06		1.58E-02	
1,1,1-Trichloroethane	2.70E-03		1.38E-04	6.49E-06	J	2.30E-06	9.90E+00	1.10E+01	
1,1,2,2-Tetrachloroethane*	ND	R	1.38E-04	ND	R	2.30E-06		3.97E-02	
1,1,2-Trichloroethane	5.57E-04		1.38E-04	2.88E-05		2.30E-06		3.16E-01	
1,1-Dichloroethane	7.84E-05		1.38E-04	1.68E-05		2.30E-06		2.30E-01	2.01E-03
1,1-Dichloroethene	ND		1.38E-04	4.84E-06	J	2.30E-06	3.18E-01	1.15E-01	
1,1-Dichloropropene	9.54E-05		1.38E-04	ND		2.30E-06		2.59E-02	2.01E-03
1,2,3-Trichlorobenzene*	9.72E-05	R	1.38E-04	ND	R	2.30E-06		4.37E-02	
1,2,3-Trichloropropane*	6.55E-04	R	1.38E-04	ND	R	2.30E-06		3.45E-01	
1,2,4-Trichlorobenzene*	4.72E-03	R	1.38E-04	ND	R	2.30E-06		2.13E-01	
1,2,4-Trimethylbenzene*	3.95E-03	R	1.38E-04	1.06E-04	R	2.30E-06		1.21E-01	
1,2-Dibromo-3-chloropropane*	ND	R	1.38E-04	ND	R	2.30E-06		5.58E-03	7.35E-02
1,2-Dibromoethane	ND		1.38E-04	ND		2.30E-06		8.22E-01	2.52E-04
1,2-Dichlorobenzene*	8.44E-05	R	1.38E-04	ND	R	2.30E-06	1.21E+00	8.63E-01	
1,2-Dichloropropane	ND		1.38E-04	ND		2.30E-06	2.05E+00	2.00E+00	
1,2-Dichloropropane	ND		1.38E-04	ND		2.30E-06	2.05E+00	2.00E+00	
1,3,5-Trimethylbenzene*	3.01E-03	R	1.38E-04	7.78E-05	R	2.30E-06		1.38E+00	
1,3-Butadiene*	1.54E-01	J	1.38E-04	5.71E-04	J	2.30E-06		2.53E-02	2.01E-03
1,3-Dichlorobenzene*	9.40E-05	R	1.38E-04	2.11E-06	R	2.30E-06		4.03E-01	
1,3-Dichloropropane	1.01E-04		1.38E-04	ND		2.30E-06		2.01E-01	
1,4-Dichlorobenzene*	5.34E-02	R	1.38E-04	2.11E-06	R	2.30E-06		3.45E-01	7.35E-03
2,2-Dichloropropane	ND		1.38E-04	ND		2.30E-06			
2-Chlorotoluene*	7.09E-04	R	1.38E-04	1.30E-05	R	2.30E-06		2.76E+00	
4-Chlorotoluene*	3.20E-04	R	1.38E-04	4.20E-06	R	2.30E-06		1.96E+00	
Acrylonitrile	8.42E-04		1.38E-04	8.40E-06	J	2.30E-06		2.47E-02	8.05E-04
Benzene	4.04E-02	J	1.38E-04	6.07E-04	J	2.30E-06	3.22E-02	9.20E-03	6.09E-03
Bromobenzene*	2.78E-02	R	1.38E-04	ND	R	2.30E-06		1.17E+00	
Bromochloromethane	ND		1.38E-04	ND		2.30E-06		6.10E+00	
Bromoform*	ND	R	1.38E-04	ND	R	2.30E-06		2.99E-02	
Bromomethane	1.62E-03		1.38E-04	6.15E-05		2.30E-06		2.24E-02	
Carbon disulfide	5.55E-04		1.38E-04	1.93E-05	J	2.30E-06		1.78E-01	
Carbon tetrachloride	ND		1.38E-04	ND		2.30E-06		1.78E-04	
Chlorobenzene*	1.46E-04	R	1.38E-04	2.06E-06	R	2.30E-06		2.65E-01	
Chloroethane	1.45E-04		1.38E-04	ND		2.30E-06	5.23E-03	1.50E-03	
Chloroform	3.38E-04		1.38E-04	2.83E-06	J	2.30E-06		2.82E-04	
Chloromethane*	8.69E-03	J	1.38E-04	5.87E-05	J	2.30E-06	2.11E-01	6.04E-02	
cis-1,2-Dichloroethene	1.06E-02		1.38E-04	2.06E-06	J	2.30E-06		4.56E+00	
cis-1,3-Dichloropropene	3.46E-03		1.38E-04	ND		2.30E-06		2.59E-02	1.36E-03
Dibromochloromethane	1.05E-02		1.38E-04	ND		2.30E-06		2.00E-02	
Dibromomethane	ND		1.38E-04	ND		2.30E-06		8.18E-01	
Dichlorodifluoromethane*	3.43E-04	J	1.38E-04	ND	UJ	2.30E-06		2.85E+01	
Ethylbenzene*	4.01E-03	R	1.38E-04	5.67E-05	R	2.30E-06	2.19E+00	2.50E+00	
Hexachlorobutadiene*	1.29E-04	R	1.38E-04	ND	R	2.30E-06		1.21E-03	
Isopropyl benzene*	3.50E-04	R	1.38E-04	7.15E-06	R	2.30E-06		1.41E+00	
m/p-Xylene*	1.06E-02	R	1.38E-04	1.40E-04	R	2.30E-06	2.62E+00	2.50E+00	
Methylene chloride	9.55E-03		1.38E-04	2.02E-05	J	2.30E-06		1.00E-03	
Naphthalene*	6.92E-03	R	1.38E-04	5.97E-03	R	2.30E-06	3.18E-01	2.99E-01	
n-Butylbenzene*	7.14E-04	R	1.38E-04	4.65E-05	R	2.30E-06		2.03E-01	
n-Propylbenzene*	3.06E-03	R	1.38E-04	7.46E-05	R	2.30E-06		1.84E+01	
o-Xylene*	5.15E-03	R	1.38E-04	5.07E-05	R	2.30E-06	2.62E+00	2.50E+00	
p-Isopropyltoluene*	1.47E-03	R	1.38E-04	6.43E-05	R	2.30E-06		1.12E-01	
sec-Butylbenzene*	1.33E-03	R	1.38E-04	2.15E-06	R	2.30E-06		1.04E-01	
Styrene*	1.16E-02	R	1.38E-04	1.87E-04	R	2.30E-06	6.84E-01	4.89E-01	
tert-Butylbenzene*	1.43E-04	R	1.38E-04	3.70E-06	R	2.30E-06		2.05E-01	
Tetrachloroethylene	ND		1.38E-04	ND		2.30E-06	2.76E+00	9.78E-01	
Toluene	2.12E-02	J	1.38E-04	3.33E-04	J	2.30E-06		1.08E+00	
trans-1,2-Dichloroethene	ND		1.38E-04	ND		2.30E-06		4.56E+00	
trans-1,3-Dichloropropene	ND		1.38E-04	ND		2.30E-06		2.59E-02	1.36E-03
Trichloroethene	1.53E-04		1.38E-04	7.18E-06	J	2.30E-06	2.16E+00	1.55E+00	
Trichlorofluoromethane*	8.96E-04		1.38E-04	2.24E-06	J	2.30E-06	2.26E+01		
Vinyl chloride*	ND	UJ	1.38E-04	1.70E-06	UJ	2.30E-06		7.48E-02	5.89E-04

*analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.
A key to data flags is included in Appendix M.

TABLE 3-6 Stack Gases
Second Continuous Test- 4/14/99
(Continued)

ORIGINAL (Red)

Parameter	Outlet Result (g/s)	Reporting Limit (g/s)	Regulatory Level (g/s)		
SVOCs			1-Hour	8-Hour	Annual
Dibenzofuran	3.85E-4	8.09E-7			
Diethylphthalate	5.57E-7J	7.29E-7		2.88E-2	
Fluorene	8.29E-5	8.85E-7		1.15E-3	
Pentachlorophenol	ND	6.77E-6		2.88E-3	
Phenanthrene	3.56E-4	9.25E-7		5.64E-3	
Anthracene	1.33E-4	9.89E-7		1.15E-3	
Di-n-butylphthalate	ND	6.19E-7			
Fluoranthene	6.95E-5	8.73E-7		4.72E-2	
Carbazole	7.78E-6J	1.24E-6		3.22E-3	
Pyrene	3.47E-5	8.29E-7		1.15E-3	
bis(2-Ethylhexyl)phthalate	7.73E-7	1.07E-6		1.16E-1	
Benzo(a)anthracene	5.90E-6J	1.00E-6			2.89E-4
Chrysene	2.23E-6J	1.38E-6		1.15E-3	
Benzo(b)fluoranthene	1.99E-6J	1.27E-6	8.31E-2		2.89E-4
Benzo(k)fluoranthene	7.95E-7J	1.32E-6			2.89E-4
Benzo(a)pyrene	1.56E-6	1.56E-6		1.15E-3	2.41E-5
Indeno(1,2,3-cd)pyrene	ND	2.29E-6			2.89E-4
Dibenz(a,h)anthracene	ND	2.68E-6			2.89E-4
Phenol	7.71E-5	2.47E-6		1.09E-1	
1,2-Dichlorobenzene	ND	2.04E-6	1.21	8.63E-1	
2-Methylphenol	3.88E-5	3.23E-6		1.27E-1	
3/4-Methylphenol	3.85E-5	3.02E-6		1.27E-1	
Nitrobenzene	ND	9.55E-7		2.88E-2	
2,4-Dimethylphenol	7.04E-6J	1.11E-6		7.55E-2	
Naphthalene	1.29E-2	1.05E-4	3.18E-1	2.99E-1	
2-Methylnaphthalene	5.79E-4	1.14E-6		3.85E-2	
Acenaphthylene	1.61E-4	7.40E-7		1.41E-02	
Acenaphthene	1.72E-4	1.12E-6		1.15E-3	
Dioxins					
Dioxin Equivalence	1.16E-10			1.15E-7	1.51E-9

no reg level

A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-7 Stack Gases
Third Continuous Re-Test 4/13/99

	Inlet Result (g/s)	Reporting Limit (g/s)	Outlet Result (g/s)	Reporting Limit (g/s)	Regulatory Level (g/s)		
VOCs					1-Hour	8-Hour	Annual
1,1,1,2-Tetrachloroethane	ND	2.08E-04	ND	3.14E-06		1.58E-02	
1,1,1-Trichloroethane	ND	2.08E-04	ND	3.14E-06	9.90E+00	1.10E+01	
1,1,2,2-Tetrachloroethane*	1.85E-04 R	2.08E-04	6.63E-06 R	3.14E-06		3.97E-02	
1,1,2-Trichloroethane	4.58E-03	2.08E-04	3.29E-05	3.14E-06		3.16E-01	
1,1-Dichloroethane	4.66E-04	2.08E-04	ND	3.14E-06		2.30E-01	2.01E-03
1,1-Dichloroethene	ND	2.08E-04	ND	3.14E-06	3.18E-01	1.15E-01	
1,1-Dichloropropene	ND	2.08E-04	ND	3.14E-06		2.59E-02	2.01E-03
1,2,3-Trichlorobenzene*	1.67E-04 R	2.08E-04	ND R	3.14E-06		4.37E-02	
1,2,3-Trichloropropane*	3.94E-04 R	2.08E-04	ND R	3.14E-06		3.45E-01	
1,2,4-Trichlorobenzene*	2.35E-03 R	2.08E-04	ND R	3.14E-06		2.13E-01	
1,2,4-Trimethylbenzene*	6.89E-03 R	2.08E-04	1.21E-04 R	3.14E-06		1.21E-01	
1,2-Dibromo-3-chloropropane*	ND R	2.08E-04	ND R	3.14E-06		5.58E-03	7.35E-02
1,2-Dibromoethane	ND	2.08E-04	ND	3.14E-06		8.22E-01	2.52E-04
1,2-Dichlorobenzene*	1.14E-04 R	2.08E-04	ND R	3.14E-06	1.21E+00	8.63E-01	
1,2-Dichloropropane	ND	2.08E-04	ND	3.14E-06	2.05E+00	2.00E+00	
1,2-Dichloropropane	ND	2.08E-04	ND	3.14E-06	2.05E+00	2.00E+00	
1,3,5-Trimethylbenzene*	6.42E-03 R	2.08E-04	1.03E-04 R	3.14E-06		1.38E+00	
1,3-Butadiene*	5.33E-01 J	2.08E-04	9.41E-04 J	3.14E-06		2.53E-02	2.01E-03
1,3-Dichlorobenzene*	1.18E-04 R	2.08E-04	ND R	3.14E-06		4.03E-01	
1,3-Dichloropropane	ND	2.08E-04	ND	3.14E-06		2.01E-01	
1,4-Dichlorobenzene*	7.91E-03 R	2.08E-04	ND R	3.14E-06		3.45E-01	7.35E-03
2,2-Dichloropropane	ND	2.08E-04	ND	3.14E-06			
2-Chlorotoluene*	1.43E-03 R	2.08E-04	2.24E-05 R	3.14E-06		2.76E+00	
4-Chlorotoluene*	7.52E-04 R	2.08E-04	9.65E-06 R	3.14E-06		1.96E+00	
Acrylonitrile	2.50E-03	2.08E-04	6.62E-06 J	3.14E-06		2.47E-02	8.05E-04
Benzene	4.46E-02 J	2.08E-04	1.75E-03 J	3.14E-06	3.22E-02	9.20E-03	6.09E-03
Bromobenzene*	1.93E-03 R	2.08E-04	ND R	3.14E-06		1.17E+00	
Bromochloromethane	ND	2.08E-04	ND	3.14E-06		6.10E+00	
Bromoform*	ND R	2.08E-04	ND R	3.14E-06		2.99E-02	
Bromomethane	ND	2.08E-04	5.11E-05	3.14E-06		2.24E-02	
Carbon disulfide	9.72E-04	2.08E-04	1.57E-05	3.14E-06		1.78E-01	
Carbon tetrachloride	ND	2.08E-04	ND	3.14E-06		1.78E-04	
Chlorobenzene*	1.99E-04 R	2.08E-04	3.85E-06 R	3.14E-06		2.65E-01	
Chloroethane	ND	2.08E-04	ND	3.14E-06	5.23E-03	1.50E-03	
Chloroform	1.69E-04	2.08E-04	ND	3.14E-06		2.82E-04	
Chloromethane*	1.46E-02 J	2.08E-04	1.13E-04 J	3.14E-06	2.11E-01	6.04E-02	
cis-1,2-Dichloroethene	3.43E-04 R	2.08E-04	ND	3.14E-06		4.56E+00	
cis-1,3-Dichloropropene	2.00E-04 R	2.08E-04	ND	3.14E-06		2.59E-02	1.36E-03
Dibromochloromethane	3.21E-04 R	2.08E-04	ND	3.14E-06		2.00E-02	
Dibromomethane	1.78E-04 R	2.08E-04	ND	3.14E-06		8.18E-01	
Dichlorodifluoromethane*	ND	2.08E-04	ND UJ	3.14E-06		2.85E+01	
Ethylbenzene*	8.12E-03 R	2.08E-04	9.45E-05 R	3.14E-06	2.19E+00	2.50E+00	
Hexachlorobutadiene*	1.85E-04 R	2.08E-04	ND R	3.14E-06		1.21E-03	
Isopropyl benzene*	6.84E-04 R	2.08E-04	9.82E-06 R	3.14E-06		1.41E+00	
m/p-Xylene*	1.98E-02 R	2.08E-04	2.36E-04 R	3.14E-06	2.62E+00	2.50E+00	
Methylene chloride	5.73E-03	2.08E-04	9.70E-06 J	3.14E-06		1.00E-03	
Naphthalene*	3.53E-02 R	2.08E-04	7.16E-03 R	3.14E-06	3.18E-01	2.99E-01	
n-Butylbenzene*	1.68E-03 R	2.08E-04	4.93E-05 R	3.14E-06		2.03E-01	
n-Propylbenzene*	6.81E-03 R	2.08E-04	6.00E-05 R	3.14E-06		1.84E+01	
o-Xylene*	7.03E-03 R	2.08E-04	8.69E-05 R	3.14E-06	2.62E+00	2.50E+00	
p-Isopropyltoluene*	3.88E-03 R	2.08E-04	8.63E-05 R	3.14E-06		1.12E-01	
sec-Butylbenzene*	1.58E-04 R	2.08E-04	2.75E-06 R	3.14E-06		1.04E-01	
Styrene*	2.36E-02 R	2.08E-04	3.62E-04 R	3.14E-06	6.84E-01	4.89E-01	
tert-Butylbenzene*	3.58E-04 R	2.08E-04	5.84E-06 R	3.14E-06		2.05E-01	
Tetrachloroethylene	ND	2.08E-04	ND	3.14E-06	2.76E+00	9.78E-01	
Toluene	6.42E-02 J	2.08E-04	4.35E-04 J	3.14E-06		1.08E+00	
trans-1,2-Dichloroethene	ND	2.08E-04	2.01E-05	3.14E-06		4.56E+00	
trans-1,3-Dichloropropene	ND	2.08E-04	ND	3.14E-06		2.59E-02	1.36E-03
Trichloroethene	2.34E-04	2.08E-04	ND	3.14E-06	2.16E+00	1.55E+00	
Trichlorofluoromethane*	5.16E-04	2.08E-04	ND	3.14E-06	2.26E+01		
Vinyl chloride*	ND UJ	2.08E-04	ND UJ	3.14E-06		7.48E-02	5.89E-04

*analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.
A key to data flags is included in Appendix M.

TABLE 3-7 Stack Gases
Third Continuous Re-Test- 4/15/99
(Continued)

ORIGINAL (Red)

Parameter	Outlet Result (g/s)	Reporting Limit (g/s)	Regulatory Level (g/s)		
SVOCs			1-Hour	8-Hour	Annual
Dibenzofuran	4.01E-4	9.26E-7			
Diethylphthalate	7.15E-7J	8.35E-7		2.88E-2	
Fluorene	7.96E-5	1.01E-6		1.15E-3	
Pentachlorophenol	ND	7.93E-6		2.88E-3	
Phenanthrene	3.54E-4	1.08E-6		5.64E-3	
Anthracene	5.12E-5	1.16E-6		1.15E-3	
Di-n-butylphthalate	ND	7.25E-7			
Fluoranthene	6.81E-5	1.02E-6		4.72E-2	
Carbazole	3.85E-6J	1.45E-6		3.22E-3	
Pyrene	3.39E-5	9.97E-7		1.15E-3	
bis(2-Ethylhexyl)phthalate	1.58E-5J	1.29E-6		1.16E-1	
Benzo(a)anthracene	6.38E-6J	1.21E-6			2.89E-4
Chrysene	9.02E-6J	1.66E-6		1.15E-3	
Benzo(b)fluoranthene	2.55E-6J	1.51E-6	8.31E-2		2.89E-4
Benzo(k)fluoranthene	9.59E-7J	1.57E-6			2.89E-4
Benzo(a)pyrene	1.86E-6	1.86E-6		1.15E-3	2.41E-5
Indeno(1,2,3-cd)pyrene	ND	2.73E-6			2.89E-4
Dibenz(a,h)anthracene	ND	3.19E-6			2.89E-4
Phenol	5.16E-5			1.09E-1	
1,2-Dichlorobenzene	ND	2.36E-6	1.21	8.63E-1	
2-Methylphenol	1.83E-5J	3.73E-6		1.27E-1	
3/4-Methylphenol	2.17E-5J	3.49E-6		1.27E-1	
Nitrobenzene	ND	1.21E-6		2.88E-2	
2,4-Dimethylphenol	1.41E-6	1.41E-6		7.55E-2	
Naphthalene	8.57E-3	3.10E-4	3.18E-1	2.99E-1	
2-Methylnaphthalene	5.22E-4	1.13E-6		3.85E-2	
Acenaphthylene	1.46E-4	8.48E-7		1.41E-02	
Acenaphthene	1.85E-4	1.28E-4		1.15E-3	
Dioxins					
Dioxin Equivalence	7.26E-11			1.15E-7	1.51E-9

A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-8
Comparison of Mass Emission Rates (g/s)

VOCs	Average Mass Emission Rate Both Continuous Units	Total Facility Maximum Allowable Emission Rate			Pass or Fail
		1-Hour	8-Hour	Annual	
1,1,1-Trichloroethane	2.00E-05	1.98E+01	2.20E+01		Pass
1,1,2,2-Tetrachloroethane*	1.18E-05		7.94E-02		Pass
1,1,2-Trichloroethane	8.17E-05		6.33E-01		Pass
1,1-Dichloroethane	1.61E-04		4.60E-01	4.03E-03	Pass
1,1-Dichloroethene	1.11E-04	6.36E-01	2.30E-01		Pass
1,2,4-Trichlorobenzene*	7.34E-06		4.26E-01		Pass
1,2,4-Trimethylbenzene*	2.06E-04		2.42E-01		Pass
1,2-Dibromoethane	6.12E-06		1.64E+00	5.03E-04	Pass
1,2-Dichlorobenzene*	6.27E-06	2.42E+00	1.73E+00		Pass
1,3,5-Trimethylbenzene*	1.71E-04		2.76E+00		Pass
1,3-Butadiene*	2.50E-03		5.06E-02	4.03E-03	Pass
1,3-Dichlorobenzene*	6.34E-06		8.05E-01		Pass
1,3-Dichloropropane	5.56E-06		4.03E-01		Pass
1,4-Dichlorobenzene*	2.46E-05		6.90E-01	1.47E-02	Pass
2-Chlorotoluene*	3.65E-05		5.52E+00		Pass
4-Chlorotoluene*	1.37E-05		3.91E+00		Pass
Acrylonitrile	7.03E-05		4.95E-02	1.61E-03	Pass
Benzene	2.26E-03	6.44E-02	1.84E-02	1.22E-02	Pass
Bromomethane	8.10E-05		4.49E-02		Pass
Carbon disulfide	7.98E-05		3.57E-01		Pass
Chlorobenzene*	9.81E-06		5.29E-01		Pass
Chloroform	1.62E-05		5.64E-04		Pass
Chloromethane*	2.29E-04	4.23E-01	1.21E-01		Pass
cis-1,2-Dichloroethene	1.60E-05		9.12E+00		Pass
Dichlorodifluoromethane*	1.49E-05		5.69E+01		Pass
Ethylbenzene*	1.48E-04	4.37E+00	4.99E+00		Pass
Isopropyl benzene*	1.86E-05		2.83E+00		Pass
m/p-Xylene*	3.79E-04	5.24E+00	4.99E+00		Pass
Methylene chloride	1.30E-04		2.00E-03		Pass
Naphthalene*	1.06E-02	6.36E-01	5.98E-01		Pass
n-Butylbenzene*	8.28E-05		4.06E-01		Pass
n-Propylbenzene*	1.27E-04		3.68E+01		Pass
o-Xylene*	1.38E-04	5.24E+00	4.99E+00		Pass
p-Isopropyltoluene*	1.25E-04		2.24E-01		Pass
sec-Butylbenzene*	5.77E-06		2.07E-01		Pass
Styrene*	5.41E-04	1.37E+00	9.78E-01		Pass
tert-Butylbenzene*	8.87E-06		4.09E-01		Pass
Toluene	8.85E-04		2.16E+00		Pass
trans-1,2-Dichloroethene	2.17E-05		9.12E+00		Pass
Trichloroethene	3.75E-05	4.32E+00	3.09E+00		Pass
Trichlorofluoromethane*	2.65E-05	4.52E+01			Pass
Vinyl chloride*	3.23E-05		1.50E-01	1.18E-03	Pass

*analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.
A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-8
Comparison of Mass Emissions Rates (g/s)

Analyte	Average Mass Emission Rate Both Continuous Units	Total Facility Maximum Allowable Emission Rate			Pass or Fail
		1-hour	8-hour	Annual	
SVOCs					
2,4-Dimethylphenol	7.83E-06		1.51E-01		Pass
2-Methylnaphthalene	1.37E-03		7.70E-02		Pass
2-Methylphenol	4.48E-05		2.53E-01		Pass
3,4-Methylphenol	4.85E-05		2.53E-01		Pass
Acenaphthene	3.84E-04		2.30E-03		Pass
Acenaphthylene	3.40E-04		2.83E-02		Pass
Anthracene	1.66E-04		2.30E-03		Pass
Benzo(a)anthracene	2.54E-05			5.79E-04	Pass
Benzo(a)pyrene	3.80E-06		2.30E-03	4.81E-05	Pass
Benzo(b)fluoranthene	1.03E-05	1.66E-01		5.79E-04	Pass
Benzo(k)fluoranthene	2.21E-06			5.79E-04	Pass
bis(2-Ethylhexyl)phthalate	1.48E-05		2.32E-01		Pass
Carbazole	1.66E-05		6.44E-03		Pass
Chrysene	3.05E-05		2.30E-03		Pass
Dibenzofuran	8.82E-04				— no screening Level?
Diethylphthalate	1.40E-06		5.76E-02		Pass
Fluoranthene	3.05E-04		9.43E-02		Pass
Fluorene	1.99E-04		2.30E-03		Pass
Naphthalene	1.92E-02	6.36E-01	5.98E-01		Pass
Phenanthrene	1.05E-03		1.13E-02		Pass
Phenol	1.19E-04		2.19E-01		Pass
Pyrene	1.43E-04		2.30E-03		Pass
Total Dioxin TEF					
Total Dioxin TEF	2.56E-10		2.30E-07	3.02E-09	Pass

Doesn't include cmpds from tables 3-5 thru 3-7 that were ND

Table 3-9
Site Perimeter VOC Air Monitoring-POP Re-Tests

	4/13/99				4/14/99				4/15/99			
Parameter	Up-13	down-3	down-4	down-5	up-13	down-4	down-5	down-6	up-10	down-1	down-2	down-15
chloromethane	0.79J	1.0J	1.1J	0.82J	0.77J	0.78J	1.0J	0.91J	ND	1.5J	1.1J	1.0J
bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15	ND	ND
methylene chloride	ND	ND	0.30	0.34	ND	ND	0.34	ND	0.46	1.1	0.27	0.65
carbon tetrachloride	ND	ND	0.14	ND	ND	ND	ND	ND	ND	0.16	ND	ND
benzene	ND	0.30	0.30	0.28	0.32	0.46	0.33	ND	0.56	0.43	0.22	0.42
toluene	0.38	ND	0.46	0.35	ND	0.52	0.40	ND	1.1	2.4	ND	0.40
tetrachloroethane	ND	ND	ND	ND	ND	ND	0.38	ND	ND	ND	ND	ND
ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.25	ND	ND
m,p-xylene	ND	ND	0.19J	ND	ND	0.34J	ND	ND	ND	0.57	ND	0.22J
o-xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.21	ND	ND
styrene	ND	ND	0.16	ND	ND	ND	ND	ND	ND	0.32	ND	ND
acetone	3.3J	5.1J	4.4J	5.9J	7.2J	3.6J	4.6J	6.8J	5.4J	16J	4.5J	3.8J
carbon disulfide	3.6	ND	ND	ND	ND	ND	ND	ND	ND	0.94	ND	ND
2-butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2	ND	ND
bezene detection limit	0.27	0.27	0.13	0.27	0.30	0.30	0.30	0.30	0.19	0.14	0.19	0.19
all else ND at...	0.27/1.3	0.27/1.3	0.13/0.66	0.27/1.3	0.30/1.5	0.30/1.5	0.30/1.5	0.30/1.5	0.19/0.94	0.14/0.7	0.19/0.94	0.19/0.94

all results in ppbv
ND-not detected
J-value is less than reporting limit but greater than zero
benzene action level 0.5ppbv

Table 3-10 Site Perimeter Particulate Air Monitoring
(all results in mg/m^3)

Date	Locations		Reading		Time Weighted Average*
			Setup	Take Down	
4/13/99	up	13	0.002	0.000	0.007
	down1	3	0.041	0.035	0.041
	down2	4	0.037	0.020	0.038
	down3	5	0.017	0.009	0.036
4/14/99	up	13	0.007	0.009	0.007
	down1	4	0.037	0.000	0.011
	down2	5	0.077	0.036	0.039
	down3	6	0.040	0.008	0.009
4/15/99	up	10	0.001	NT**	NT**
	down1	15	0.012	NT**	NT**
	down2	1	0.005	NT**	NT**
	down3	2	0.060	NT**	NT**

* Time Weighted Averages are based on 4 hours for 4/13/99 and 4/14/99.
** NT - Not taken because Data Rams were retrieved after 3 hours due to rain.
Action Level: 2.75 mg/m3

TABLE 3-11- Treated Soil
First Continuous Test, 4/13/99

ORIGINAL (Red)

Carcinogenic Polynuclear Aromatic Hydrocarbons	On-site by 8270		Off-site by 8310/8270*	
	Result (ug/kg)	Reporting Limit (ug/kg)	Result (ug/kg)	Reporting Limit (ug/kg)
Benzo[a]anthracene	1,000	400	1,500J	36
Chrysene	1,500	400	2,400J	36
Benzo[b]fluoranthene	1,600	400	2,600J	71
Benzo[k]fluoranthene	990	400	810J	36
Benzo[a]pyrene	340J	400	640J	36
Dibenzo[a,h]anthracene	ND	400	110J	71
Indeno[1,2,3-cd]pyrene	ND	400	360J	36
Carbazole*	ND	400	63J	170
Total Carcinogenic Polynuclear Aromatic Hydrocarbons	5,430 ug/kg		8,483 ug/kg	
Subsurface criteria: < 1,000 ug/kg Benzo(a)Pyrene Equivalence	832 ug/kg (ND=1/2 RL)		1,206 ug/kg (ND=1/2 RL)	
Percent Moisture	7%		7%	
Pentachlorophenol by 8270 Criteria: < 1,700 ug/kg subsurface; 5,000 ug/kg surface	ND	400	ND	350

A key to data flags is included in Appendix M.

TABLE 3-11- Treated Soil
First Continuous Test, 4/13/99

ORIGINAL (Red)

Parameter	Results (ug/L)	Reporting Limits (ug/L)	Regulatory Levels (ug/L)
TCLP Polynuclear Aromatic Hydrocarbons by 1311/8310			
Acenaphthene	ND	2.0	100,000
Acenaphthylene	ND	4.0	--
Anthracene	ND	0.20	600,000
Benzo[a]anthracene	ND	0.20	0.2
Benzo[b]fluoranthene	ND	0.40	6
Benzo[k]fluoranthene	ND	0.20	200
Benzo[a]pyrene	ND	0.20	10
Chrysene	ND	0.20	60
Dibenzo[a,h]anthracene	ND	0.10	0.1
Fluoranthene	0.49	0.40	60,000
Fluorene	ND	0.40	--
Indeno[1,2,3-cd]pyrene	ND	0.20	6
Naphthalene	ND	2.0	60,000
Phenanthrene	1.1	0.20	100
Pyrene	0.28	0.20	60,000
Semivolatile Organic Compounds by 8270 (TCLP values extrapolated from totals)			
4-Chloro-3-methylphenol	ND	8.5	10,000
2-Chlorophenol	ND	8.5	10,000
2,4-Dimethylphenol	ND	8.5	40,000
2,4-Dinitrophenol	ND/UJ	17.5	4,000
Carbazole	3.2J	8.5	200
Phenol	12.5	8.5	1,000,000
2,3,4,6-Tetrachlorophenol	ND	8.5	60,000
1,4-Dichlorobenzene	ND	8.5	7,500
2,4-Dinitrotoluene	ND	8.5	130
Hexachlorobenzene	ND	8.5	130
Hexachlorobutadiene	ND	8.5	500
Hexachloroethane	ND	8.5	3,000
2-Methylphenol	ND	8.5	200,000
3-Methylphenol	ND	8.5	200,000
4-Methylphenol	ND	8.5	200,000
Nitrobenzene	ND	8.5	2,000
Pyridine	ND	8.5	5,000
2,4,5-Trichlorophenol	ND	17.5	200,000
2,4,6-Trichlorophenol	ND	8.5	500
Pentachlorophenol	ND	17.5	60
TCLP Metals by 1311/7470/6010			
Mercury	ND	0.2	200
Arsenic	6.6B	10	5,000
Barium	143B	10	100,000
Cadmium	ND	10	1,000
Chromium	ND	20	5,000
Lead	ND	5	5,000
Selenium	ND	10	1,000
Silver	ND	10	5,000

A key to data flags is included in Appendix M.

TABLE 3-12- Treated Soil
Second Continuous Test, 4/14/99

ORIGINAL (Red)

Carcinogenic Polynuclear Aromatic Hydrocarbons	On-site by 8270		Off-site by 8310/8270*	
	Result (ug/kg)	Reporting Limit (ug/kg)	Result (ug/kg)	Reporting Limit (ug/kg)
Benzo[a]anthracene	1,100	400	800K	39
Chrysene	1,700	400	1,500K	39
Benzo[b]fluoranthene	1,100	400	1,800K	77
Benzo[k]fluoranthene	710	400	530K	39
Benzo[a]pyrene	240J	400	460K	39
Dibenzo[a,h]anthracene	ND	400	ND	77
Indeno[1,2,3-cd]pyrene	ND	400	290K	39
Carbazole*	ND	400	ND	1,800
Total Carcinogenic Polynuclear Aromatic Hydrocarbons	4,850 ug/kg		5,380 ug/kg	
Subsurface criteria: < 1,000 ug/kg Benzo(a)Pyrene Equivalence	689 ug/kg (ND=1/2 RL)		797 ug/kg (ND =1/2 RL)	
Percent Moisture	10%		14%	
Pentachlorophenol by 8270 Criteria: < 1,700 ug/kg subsurface; 5,000 ug/kg surface	ND	400	ND	3,800*

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.

A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-12- Treated Soil
Second Continuous Test, 4/14/99

Parameter	Results (ug/L)	Reporting Limits (ug/L)	Regulatory Levels (ug/L)
TCLP Polynuclear Aromatic Hydrocarbons by 1311/8310			
Acenaphthene	ND	2.0	100,000
Acenaphthylene	ND	4.0	--
Anthracene	ND	0.20	600,000
Benzo[a]anthracene	ND	0.20	0.2
Benzo[b]fluoranthene	ND	0.40	6
Benzo[k]fluoranthene	ND	0.20	200
Benzo[a]pyrene	ND	0.20	10
Chrysene	ND	0.20	60
Dibenzo[a,h]anthracene	ND	0.10	0.1
Fluoranthene	0.49	0.40	60,000
Fluorene	ND	0.40	--
Indeno[1,2,3-cd]pyrene	ND	0.20	6
Naphthalene	ND	2.0	60,000
Phenanthrene	1.2	0.20	100
Pyrene	0.23	0.20	60,000
Semivolatile Organic Compounds by 8270 (TCLP values extrapolated from totals)			
4-Chloro-3-methylphenol	ND	90	10,000
2-Chlorophenol	ND	90	10,000
2,4-Dimethylphenol	ND	90	40,000
2,4-Dinitrophenol	ND	190	4,000
Carbazole	ND	90	200
Phenol	ND	90	1,000,000
2,3,4,6-Tetrachlorophenol	ND	90	60,000
1,4-Dichlorobenzene	ND	90	7,500
2,4-Dinitrotoluene	ND	90	130
Hexachlorobenzene	ND	90	130
Hexachlorobutadiene	ND	90	500
Hexachloroethane	ND	90	3,000
2-Methylphenol	ND	90	200,000
3-Methylphenol	ND	90	200,000
4-Methylphenol	ND	90	200,000
Nitrobenzene	ND	90	2,000
Pyridine	ND	90	5,000
2,4,5-Trichlorophenol	ND	190	200,000
2,4,6-Trichlorophenol	ND	90	500
Pentachlorophenol	ND	190*	60
TCLP Metals by 1311/7470/6010			
Mercury	ND	0.2	200
Arsenic	6.6BK	10	5,000
Barium	198B	50	100,000
Cadmium	ND	10	1,000
Chromium	ND	20	5,000
Lead	3B	5	5,000
Selenium	ND	10	1,000
Silver	ND	10	5,000

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.
A key to data flags is included in Appendix M.

TABLE 3-13- Treated Soil
Third Continuous Test, 4/15/99

ORIGINAL (Red)

	On-site by 8270		Off-site by 8310/8270*	
Carcinogenic Polynuclear Aromatic Hydrocarbons	Result (ug/kg)	Reporting Limit (ug/kg)	Result (ug/kg)	Reporting Limit (ug/kg)
Benzo[a]anthracene	3,800	400	3,300K	55
Chrysene	4,700	400	4,200K	55
Benzo[b]fluoranthene	3,400	400	3,500K	110
Benzo[k]fluoranthene	2,200	400	1,300K	55
Benzo[a]pyrene	1,200	400	1,400K	55
Dibenzo[a,h]anthracene	270J	400	130K	110
Indeno[1,2,3-cd]pyrene	520	400	600K	55
Carbazole*	ND	400	ND	1,700
Total Carcinogenic Polynuclear Aromatic Hydrocarbons	16,090 ug/kg		14,430 ug/kg	
Subsurface criteria: < 1,000 ug/kg Benzo(a)Pyrene Equivalence	2,269 ug/kg (ND=1/2 RL)		2,290 ug/kg (ND=1/2 RL)	
Percent Moisture	9%		9%	
Pentachlorophenol by 8270 Criteria: < 1,700 ug/kg subsurface; 5,000 ug/kg surface	ND	400	ND	3,600*

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.
A key to data flags is included in Appendix M.

TABLE 3-13- Treated Soil
Third Continuous Test, 4/15/99

ORIGINAL (Red)

Parameter	Results (ug/L)	Reporting Limits (ug/L)	Regulatory Levels (ug/L)
TCLP Polynuclear Aromatic Hydrocarbons by 1311/8310			
Acenaphthene	ND	2.0	100,000
Acenaphthylene	ND	4.0	--
Anthracene	0.34	0.20	600,000
Benzo[a]anthracene	ND	0.20	0.2
Benzo[b]fluoranthene	ND	0.40	6
Benzo[k]fluoranthene	ND	0.20	200
Benzo[a]pyrene	ND	0.20	10
Chrysene	ND	0.20	60
Dibenzo[a,h]anthracene	ND	0.10	0.1
Fluoranthene	2.1	0.40	60,000
Fluorene	ND	0.40	--
Indeno[1,2,3-cd]pyrene	ND	0.20	6
Naphthalene	ND	2.0	60,000
Phenanthrene	4.3	0.20	100
Pyrene	0.95	0.20	60,000
Semivolatile Organic Compounds by 8270 (TCLP values extrapolated from totals)			
4-Chloro-3-methylphenol	ND	85	10,000
2-Chlorophenol	ND	85	10,000
2,4-Dimethylphenol	ND	85	40,000
2,4-Dinitrophenol	ND	180	4,000
Carbazole	ND	85	200
Phenol	ND	85	1,000,000
2,3,4,6-Tetrachlorophenol	ND	85	60,000
1,4-Dichlorobenzene	ND	85	7,500
2,4-Dinitrotoluene	ND	85	130
Hexachlorobenzene	ND	85	130
Hexachlorobutadiene	ND	85	500
Hexachloroethane	ND	85	3,000
2-Methylphenol	ND	85	200,000
3-Methylphenol	ND	85	200,000
4-Methylphenol	ND	85	200,000
Nitrobenzene	ND	85	2,000
Pyridine	ND	85	5,000
2,4,5-Trichlorophenol	ND	180	200,000
2,4,6-Trichlorophenol	ND	85	500
Pentachlorophenol	ND	180*	60
TCLP Metals by 1311/7470/6010			
Mercury	ND	0.2	200
Arsenic	8BK	10	5,000
Barium	179B	50	100,000
Cadmium	ND	10	1,000
Chromium	ND	20	5,000
Lead	3.5B	5	5,000
Selenium	ND	10	1,000
Silver	4.4B	10	5,000

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.

A key to data flags is included in Appendix M.

ORIGINAL (Red)

Table 3-14: B(a)P Equivalence Scaling Factors

Compound	Benzo(a)pyrene Scaling Factor
benzo(a)anthracene	0.1
benzo(b)fluoranthene	0.1
benzo(k)fluoranthene	0.01
benzo(a)pyrene	1.0
chrysene	0.001
dibenzo(a,h)anthracene	1.0
indeno(1,2,3-cd)pyrene	0.1
carbazole	0.003

TABLE 3-15- Hot Cyclone
First Continuous Test, 4/13/99

Carcinogenic Polynuclear Aromatic Hydrocarbons	Off-site by 8310/8270*	
	Result (ug/kg)	Reporting Limit (ug/kg)
Benzo[a]anthracene	29,000J	420
Chrysene	25,000J	420
Benzo[b]fluoranthene	18,000J	830
Benzo[k]fluoranthene	7,400J	420
Benzo[a]pyrene	6,900J	420
Dibenzo[a,h]anthracene	420J	830
Indeno[1,2,3-cd]pyrene	1,500J	420
Carbazole*	1,700J	7,900
Total Carcinogenic Polynuclear Aromatic Hydrocarbons	89,920 ug/kg	
Subsurface criteria: < 1,000 ug/kg Benzo(a)Pyrene Equivalence	12,275 ug/kg (ND=1/2 RL)	
Percent Moisture	0%	
Pentachlorophenol by 8270 Criteria: < 1,700 ug/kg subsurface; 5,000 ug/kg surface	ND	7,900*

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.
A key to data flags is included in Appendix M.

TABLE 3-15- Hot Cyclone
First Continuous Test, 4/13/99

ORIGINAL (Red)

Parameter	Results (ug/L)	Reporting Limits (ug/L)	Regulatory Levels (ug/L)
TCLP Polynuclear Aromatic Hydrocarbons by 1311/8310			
Acenaphthene	11	2.0	100,000
Acenaphthylene	ND	4.0	--
Anthracene	3.1	0.2	600,000
Benzo[a]anthracene	ND	0.2	0.2
Benzo[b]fluoranthene	ND	0.4	6
Benzo[k]fluoranthene	ND	0.2	200
Benzo[a]pyrene	ND	0.2	10
Chrysene	ND	0.2	60
Dibenzo[a,h]anthracene	ND	0.1	0.1
Fluoranthene	5.9	0.4	60,000
Fluorene	4.3	0.4	--
Indeno[1,2,3-cd]pyrene	ND	0.2	6
Naphthalene	180	2.0	60,000
Phenanthrene	38	0.2	100
Pyrene	3.1	0.2	60,000
Semivolatile Organic Compounds by 8270 (TCLP values extrapolated from totals)			
4-Chloro-3-methylphenol	ND	395	10,000
2-Chlorophenol	ND	395	10,000
2,4-Dimethylphenol	ND	395	40,000
2,4-Dinitrophenol	ND/UJ	800	4,000
Carbazole	85J	395*	200
Phenol	ND	395	1,000,000
2,3,4,6-Tetrachlorophenol	ND	395	60,000
1,4-Dichlorobenzene	ND	395	7,500
2,4-Dinitrotoluene	ND	395*	130
Hexachlorobenzene	ND	395*	130
Hexachlorobutadiene	ND	395	500
Hexachloroethane	ND	395	3,000
2-Methylphenol	ND	395	200,000
3-Methylphenol	ND	395	200,000
4-Methylphenol	ND	395	200,000
Nitrobenzene	ND	395	2,000
Pyridine	ND	395	5,000
2,4,5-Trichlorophenol	ND	800	200,000
2,4,6-Trichlorophenol	ND	395	500
Pentachlorophenol	ND	800*	60
TCLP Metals by 1311/7470/6010			
Mercury	ND	0.2	200
Arsenic	20.6BK	10	5,000
Barium	234B	50	100,000
Cadmium	0.46B	10	1,000
Chromium	ND	20	5,000
Lead	ND	5	5,000
Selenium	3.6B	10	1,000
Silver	ND	10	5,000

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.

A key to data flags is included in Appendix M.

TABLE 3-16- Hot Cyclone
Second Continuous Test, 4/14/99

Carcinogenic Polynuclear Aromatic Hydrocarbons	Off-site by 8310/8270* Result (ug/kg)	Off-site by 8310/8270* Reporting Limit (ug/kg)
Benzo[a]anthracene	7,300J	80
Chrysene	7,200	80
Benzo[b]fluoranthene	5,900	160
Benzo[k]fluoranthene	2,400	80
Benzo[a]pyrene	2,000	80
Dibenzo[a,h]anthracene	ND	160
Indeno[1,2,3-cd]pyrene	550J	80
Carbazole*	ND	4,000
Total Carcinogenic Polynuclear Aromatic Hydrocarbons	25,530 ug/kg	
Subsurface criteria: < 1,000 ug/kg Benzo(a)Pyrene Equivalence	3,487 ug/kg (ND=1/2 RL)	
Percent Moisture	0%	
Pentachlorophenol by 8270 Criteria: < 1,700 ug/kg subsurface; 5,000 ug/kg surface	ND	8,200*

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.
A key to data flags is included in Appendix M.

ORIGINAL
(Red)

TABLE 3-16- Hot Cyclone
Second Continuous Test, 4/14/99

Parameter	Results (ug/L)	Reporting Limits (ug/L)	Regulatory Levels (ug/L)
TCLP Polynuclear Aromatic Hydrocarbons by 1311/8310			
Acenaphthene	ND	2.0	100,000
Acenaphthylene	ND	4.0	--
Anthracene	0.47	0.2	600,000
Benzo[a]anthracene	ND	0.2	0.2
Benzo[b]fluoranthene	ND	0.4	6
Benzo[k]fluoranthene	ND	0.2	200
Benzo[a]pyrene	ND	0.2	10
Chrysene	ND	0.2	60
Dibenzo[a,h]anthracene	0.1	0.1	0.1
Fluoranthene	1.1	0.4	60,000
Fluorene	ND	0.4	--
Indeno[1,2,3-cd]pyrene	ND	0.2	6
Naphthalene	17	2.0	60,000
Phenanthrene	7.7	0.2	100
Pyrene	0.54	0.2	60,000
Semivolatile Organic Compounds by 8270 (TCLP values extrapolated from totals)			
4-Chloro-3-methylphenol	ND	200	10,000
2-Chlorophenol	ND	200	10,000
2,4-Dimethylphenol	ND	200	40,000
2,4-Dinitrophenol	ND	410	4,000
Carbazole	ND	200	200
Phenol	ND	200	1,000,000
2,3,4,6-Tetrachlorophenol	ND	200	60,000
1,4-Dichlorobenzene	ND	200	7,500
2,4-Dinitrotoluene	ND	200*	130
Hexachlorobenzene	ND	200*	130
Hexachlorobutadiene	ND	200	500
Hexachloroethane	ND	200	3,000
2-Methylphenol	ND	200	200,000
3-Methylphenol	ND	200	200,000
4-Methylphenol	ND	200	200,000
Nitrobenzene	ND	200	2,000
Pyridine	ND	200	5,000
2,4,5-Trichlorophenol	ND	410	200,000
2,4,6-Trichlorophenol	ND	200	500
Pentachlorophenol	ND	410*	60
TCLP Metals by 1311/7470/6010			
Mercury	ND	0.2	200
Arsenic	15.2BK	10	5,000
Barium	230B	50	100,000
Cadmium	0.73B	10	1,000
Chromium	ND	20	5,000
Lead	5.2B	5	5,000
Selenium	ND	10	1,000
Silver	4.6B	10	5,000

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.
A key to data flags is included in Appendix M.

ORIGINAL (Red)

TABLE 3-17- Hot Cyclone
Third Continuous Test, 4/15/99

Carcinogenic Polynuclear Aromatic Hydrocarbons	Off-site by 8310/8270*	
	Result (ug/kg)	Reporting Limit (ug/kg)
Benzo[a]anthracene	1,100J	33
Chrysene	1,700	33
Benzo[b]fluoranthene	1,200	66
Benzo[k]fluoranthene	300	33
Benzo[a]pyrene	50	33
Dibenzo[a,h]anthracene	ND	66
Indeno[1,2,3-cd]pyrene	83	33
Carbazole*	ND	790
Total Carcinogenic Polynuclear Aromatic Hydrocarbons	4,433 ug/kg	
Subsurface criteria: < 1,000 ug/kg Benzo(a)Pyrene Equivalence	326 ug/kg (ND=1/2 RL)	
Percent Moisture	0%	
Pentachlorophenol by 8270 Criteria: < 1,700 ug/kg subsurface; 5,000 ug/kg surface	ND	1,600

A key to data flags is included in Appendix M.

TABLE 3-17- Hot Cyclone
Third Continuous Test, 4/15/99

ORIGINAL (Red)

Parameter	Results (ug/L)	Reporting Limits (ug/L)	Regulatory Levels (ug/L)
TCLP Polynuclear Aromatic Hydrocarbons by 1311/8310			
Acenaphthene	ND	2.0	100,000
Acenaphthylene	ND	4.0	--
Anthracene	ND	0.2	600,000
Benzo[a]anthracene	ND	0.2	0.2
Benzo[b]fluoranthene	ND	0.4	6
Benzo[k]fluoranthene	ND	0.2	200
Benzo[a]pyrene	ND	0.2	10
Chrysene	ND	0.2	60
Dibenzo[a,h]anthracene	ND	0.1	0.1
Fluoranthene	ND	0.4	60,000
Fluorene	ND	0.4	--
Indeno[1,2,3-cd]pyrene	ND	0.2	6
Naphthalene	ND	2.0	60,000
Phenanthrene	1.3	0.2	100
Pyrene	ND	0.2	60,000
Semivolatile Organic Compounds by 8270 (TCLP values extrapolated from totals)			
4-Chloro-3-methylphenol	ND	39.5	10,000
2-Chlorophenol	ND	39.5	10,000
2,4-Dimethylphenol	ND	39.5	40,000
2,4-Dinitrophenol	ND/UJ	80	4,000
Carbazole	ND	39.5	200
Phenol	14J	39.5	1,000,000
2,3,4,6-Tetrachlorophenol	ND	39.5	60,000
1,4-Dichlorobenzene	ND	39.5	7,500
2,4-Dinitrotoluene	ND	39.5	130
Hexachlorobenzene	ND	39.5	130
Hexachlorobutadiene	ND	39.5	500
Hexachloroethane	ND	39.5	3,000
2-Methylphenol	ND	39.5	200,000
3-Methylphenol	ND	39.5	200,000
4-Methylphenol	ND	39.5	200,000
Nitrobenzene	ND	39.5	2,000
Pyridine	ND	39.5	5,000
2,4,5-Trichlorophenol	ND	80	200,000
2,4,6-Trichlorophenol	ND	39.5	500
Pentachlorophenol	ND	80*	60
TCLP Metals by 1311/7470/6010			
Mercury	ND	0.2	200
Arsenic	12.8BK	10	5,000
Barium	321B	50	100,000
Cadmium	0.69B	10	1,000
Chromium	ND	20	5,000
Lead	5.1B	5	5,000
Selenium	ND	10	1,000
Silver	4.8B	10	5,000

*Reporting Limit elevated due to necessary dilution for high concentrations of phenanthrene and fluoranthene.
A key to data flags is included in Appendix M.

Table 3-18
SMWT Water Treatment Plant POP Re-Test Sampling
WTP2 Process Results
(all results in ug/L unless otherwise noted)
April 14, 1999

Parameter	Equalization Tank Effluent	AOP Reactor Influent	AOP Reactor Effluent	1st Carbon Effluent	Final Discharge Effluent	Reporting Limit[1] (µg/L)	Avg. Discharge Limit (µg/L)	Max. Discharge Limit (µg/L)
Volatile Organic Compounds by 8260								
Toluene	190	NT	NT	5J	ND/UJ	5	26	80
Chloroform	ND	NT	NT	ND/UJ	ND/UJ	5	21	46
Methylene chloride	7B	NT	NT	3BJ	7BJ	5	32	89
Benzene	270	NT	NT	180	ND/UJ	5	37	136
Ethylbenzene	32	NT	NT	ND/UJ	ND/UJ	5	32	108
Styrene	170	NT	NT	ND/UJ	ND/UJ	5	--	--
Xylenes (total)	120	NT	NT	3J	ND/UJ	15	--	--
Semivolatile Organic Compounds by 8270								
Carbazole	420J	210J	260J	ND	ND	5	--	--
Bis(2-ethylhexyl) phthalate	ND	ND	ND	ND	ND	5	103	279
Dibenzofuran	850J	440J	340J	ND	ND	5	--	--
di-n-Butyl phthalate	ND	ND	ND	ND	ND	5	27	57
Diethyl phthalate	ND	ND	ND	ND	ND	5	81	203
Dimethyl phthalate	ND	ND	ND	ND	ND	5	19	47
Phenol	13,000	11,000	5,300	7,300	25	5	15	26
2-Methylphenol	4,100	2,400	1,200	ND	ND	5	--	--
3+4-Methylphenol	7,500	4,800	2,400	ND	3J	5	--	--
2,4-Dimethylphenol	1,700	970J	420J	ND	ND	5	18	36
Pentachlorophenol	ND	ND	ND	2,400	ND	10	13	20
Polynuclear Aromatic Hydrocarbons (PAHs) by 8270/8310[3]								
Acenaphthene	650J	370J	210J	ND	ND[3]	5/0.1[3]	22	59
Acenaphthylene	610J	490J	160J	ND	ND[3]	5/1.0[3]	22	59
Anthracene	360J	ND	ND	ND	0.28[3]	5/0.05[3]	22	59
Benzo(a)anthracene	ND	ND	ND	ND	ND[3]	5/0.05[3]	22	59
Benzo(b)fluoranthene	ND	ND	ND	ND	ND[3]	5/0.1[3]	--	--
Benzo(k)fluoranthene	ND	ND	ND	ND	ND[3]	5/0.05[3]	22	59
Benzo(a)pyrene	ND	ND	ND	ND	ND[3]	5/0.05[3]	23	61
Chrysene	ND	ND	ND	ND	ND[3]	5/0.05[3]	22	59
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND[3]	5/0.04[3]	--	--
Fluoranthene	510J	ND	ND	ND	0.28J[3]	5/0.1[3]	25	68
Fluorene	370J	ND	110J	ND	ND[3]	5/0.1[3]	22	59
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND[3]	5/0.05[3]	--	--
Naphthalene	9,200	7,200	3,400	ND	1.3[3]	5/0.1[3]	22	59
Phenanthrene	1,500J	240J	330J	ND	0.34[3]	5/0.05[3]	22	59
Pyrene	310J	ND	ND	ND	0.15[3]	5/0.05[3]	25	67

ORIGINAL (Red)

Table 3-18
SMWT Water Treatment Plant POP Re-Test Sampling
WTP2 Process Results
(all results in ug/L unless otherwise noted)
April 14, 1999

Parameter	Equalization Tank Effluent	AOP Reactor Influent	AOP Reactor Effluent	1st Carbon Effluent	Final Discharge Effluent	Reporting Limit[1] (µg/L)	Avg. Discharge Limit (µg/L)	Max. Discharge Limit (µg/L)
Metals by 6010								
Arsenic	45.8	NT	NT	NT	14K	3.6	200	400
Barium	184B	NT	NT	NT	67.9B	1.0	1,000	2,000
Cadmium	ND	NT	NT	NT	ND	0.43	1.1	3.9
Chromium	53.1	NT	NT	NT	ND	5.4	500	1,000
Copper	70.7	NT	NT	NT	12B	3.8	12	18
Iron	60,200	NT	NT	NT	99B	8.9	1,500	3,000
Lead	37.7	NT	NT	NT	ND	2.7	3.2	82
Nickel	17.8B	NT	NT	NT	ND	6.3	160	1,400
Selenium	7.8	NT	NT	NT	8.2B	2.1	5	20
Silver	4.6B	NT	NT	NT	ND/UL	3.7	--	4.1
Zinc	54.9	NT	NT	NT	ND	5.5	110	120
Mercury by 7470/BR0002[4]	7.5	NT	NT	NT	0.00164J[4]	0.2/ 0.0005[4]	0.012	2.4
Trivalent Arsenic by BR0021	8.85	NT	NT	NT	9.05	0.05	190	360
Cyanide by 335.2	2,460	NT	NT	NT	1,250	5	7.3	31.3
Fluoride by 340.2	NT	NT	NT	NT	1,810	100	10,000	20,000
Ammonia by 350.1	NT	NT	NT	NT	238,000	100	18,900 @ pH = 7 5,600 @ pH = 8	1,200 @ pH = 7 760 @ pH = 8
TKN by 351.3	NT	NT	NT	NT	288,000	200	--	20,000
TPH-GRO by 8015B	38,000	NT	NT	NT	ND	50	--	15,000
TPH-DRO by 8015B	120,000	NT	NT	NT	ND	100	--	15,000
Total Phosphorus by 365.2	NT	NT	NT	NT	60	20	500	1,000
TSS by 160.2	616,000	NT	NT	NT	7,000	200	30,000	45,000
pH by 9040B	7.64	NT	NT	NT	7.18	±0.01	--	6.5- 8.5
Turbidity by 180.1 (NTU)	NT	NT	NT	NT	6.2	1	50	150
Hex. Cr by Hach 8023	NT	NT	NT	NT	ND	10	11	16
BOD5 by 405.1	NT	NT	NT	NT	240,000	3,000	5,000	10,000
D.O. by 4500-OG	2,200	NT	NT	NT	6,800	±100	--	5,000[2]
Temp. by 170.1 (°C)	NT	NT	NT	NT	NT	±1	--	32

[1] Undiluted samples
[2] Minimum discharge standard
[3] Final discharge effluent PAHs analyzed by Method 8310
[4] Final discharge effluent mercury analyzed by Method BR0002
NT- not taken
ND- not detected at or above reporting limit

ORIGINAL
(Red)

APPENDIX A

[redacted]

ORIGINAL (Red)

Pre –RE-POP Quality Control Checklist

Please initial and date each answer provided

1. Are there any outstanding safety deficiencies that need to be corrected? ETG Verified by/Date (See attachment)

2. Are there any outstanding Workmanship deficiencies that need to be corrected?(list) Solenoid valve on WESP #2 pumps. (See attachment)

3. Are Datarams operational? 4-yes Are spares present? yes - 1

4. Are SUMMA Canisters on site? Yes └3 days Are spares present (1 days worth)? Yes - 1 day

5. Has soil moisture data been recorded for Feed material? Yes by ETG (see attachment) % moisture =

   Date % moisture = Date

6. Have PAH samples been collected and analyzed for POP soil? yes Total PAH = POPCOMP3 5,762 mg/m³

7. Is material (soil) protected for use in POP? Yes – area is caution taped

8. Has required preventative maintenance been performed? (See attachment) What maintenance is outstanding? When will it be completed?

9. Have all Stack Sampling ports been properly installed? (See attachment) Verified by/Date:

10. Is scaffolding installed for stack sampling? (See attachment)

11. Have new twin screws been installed? (See attachment) Date:

12. Has a 15 t/hr test been performed one week prior to start of pop? JMK yes Note Max. feed rate obtained

13. Is there, on site, a sufficient supply of :

- Air monitoring calibration/fuel gas: yes — Verified by/Date: JMK
- CPM monitor calibration/fuel gas: yes — Verified by/Date: (see attachment) 4/12/99
- Propane for CTDU pilots: yes — Verified by/Date: JMK 4/2 filled @ 70% 4/10/99
- Fuel for CTDU: yes — Verified by/Date: (see attachment)
- Nitrogen for CTDU: yes — Verified by/Date: (See attachment)
- Sampling materials: yes — Verified by/Date: VBS

14. Is Air Recon set up for sampling? ETG provided 115V power supply (See Attachment) Verified by/Date: VBS Including : Power supply 115 for sample prep trailer: yes Power supply for sampling equipment: yes Trailer laydown area: yes

15. Has a data formatter/compiler been designated? (Tracy Moore) yes - JMK 4/12/99 – Tracy Moore

16. Is data validator for re-pop selected and under contract?

ETG Environmental, Inc.

ORIGINAL (Red)

Memo

To: Vishal Shah
Southern Maryland Wood Treating Site

From: Gordon D. Chin, Site Manager

CC: File

Date: 05/01/99

Re: Pre-POP Quality Control Checklist

The following are ETG's responses to the referenced subject above based on the 4/5/99 meeting:

1. C. Tabano and I observed no outstanding safety deficiencies as of 4/4/99.
2. The following workmanship items were recognized and were completed on or by 4/10/99:
    - Inspect/repair FTO poppet valve assemblies
    - Replace I.D. Fan seal
    - Inspect and apply new hard-facing to Twin Screw flighting
    - Repair leaks in Discharge Screw housing
    - Inspect/repair Rod Deck and WESP units
    - Overall general maintenance and inspection
3. ICF KE responsibility.
4. ICF KE responsibility.
5. ICF KE responsibility.
6. ICF KE responsibility.
7. ICF KE responsibility.
8. See item 2 response.

ORIGINAL
(Red)

9. All monitoring ports will be installed on 4/12/99 in accordance with AirRecon requirements and sketches provided to ETG

10. Scaffolding has been reserved for pickup and will be installed on 4/12/99.

11. ETG will replace TWIN Screws contingent upon outcome of Pre-POP soils process testing. ETG may elect to hard face the flighting instead.

12. This test is scheduled to take place on or before Wednesday 4/14/99.

13. ETG has verified the following, other items are ICF KE responsibility:

    - CPM gases – Daily by Joyce Leslie
    - Propane - Daily by Joyce Leslie
    - Fuel Oil - Daily by Joyce Leslie
    - Nitrogen - Daily by Joyce Leslie

14. ETG will supply 115-Volt power supply and an area in the Control Trailer for AirRecon.

15. ICF KE responsibility.

16. ICF KE responsibility.

[redacted]

ORIGINAL (Red)

Pre –RE-POP Quality Control Checklist

Please initial and date each answer provided

1. Are there any outstanding safety deficiencies that need to be corrected? Verified by/Date
2. Are there any outstanding Workmanship deficiencies that need to be corrected?(list) (1) FTO; inspect poppet valve
3. Are Datarams operational? ✓ Are spares present? (2) Housing and
4. Are SUMMA Canisters on site? ✓ Are spares present (1 days worth)? (3) twin screw insp (follow-up on Thu)
5. Has soil moisture data been recorded for Feed material? % moisture =

   ✓ Date % moisture = 10% Date (4) General Mt on C#2 on Fri Sat, or Su

6. Have PAH samples been ~~collected and analyzed for POP soil?~~ Total PAH =

   337 ppm

7. Is material (soil) protected for use in POP? ✓ Tue am - One more search for hot material
8. Has required preventative maintenance been performed? ✓ What maintenance is outstanding? When will it be completed?
9. Have all Stack Sampling ports been properly installed? ✓ Verified by/Date:
10. Is scaffolding installed for stack sampling? ✓
11. Have new twin screws been installed? ✓ Date:
12. Has a 15 t/hr test been performed one week prior to start of pop? Note Max. feed rate obtained Wed 4 hrs min - Bring 80 hrs/ton 4 truck loads Tue ~~[illegible]~~ noon
13. Is there, on site, a sufficient supply of :

- Air monitoring calibration/fuel gas: Verified by/Date:
- CPM monitor calibration/fuel gas: Verified by/Date:
- Propane for CTDU pilots: Verified by/Date:
- Fuel for CTDU: Verified by/Date:
- Nitrogen for CTDU: Verified by/Date:
- ✓ Sampling materials: Verified by/Date:

14. Is Air Recon set up for sampling? Verified by/Date: Including ~~: Power supply~~ 110

    Make sure they have sample media

    for sample prep trailer: ~~Power supply for~~ sampling equipment: Trailer laydown area: ✓

15. Has a data formatter/compiler been designated? (Tracy Moore) ✓
16. Is data validator for re-pop selected and under contract?

ORIGINAL (Red)

Table B-1 : Discussion of Continuous Test Operational Parameters Recorded During POP II Test Runs

Soil Feed Rate Setpoint
The value recorded is the percent of 60 Hz (full output speed) of the Variable Frequency Drive (VFD). The VFD controls the rotational speed of the Twin Feed Screw. The averages for the three runs were 40.0%, 51.5% and 53.0%. The goal of the POP II test runs were to achieve a treatment rate of 15.0 tons per hour verified by volumetric load tests. The actual feed rates averaged 14.35, 13.58 and 13.64; for POP II test runs 1, 2 and 3, respectively.

Thermal Desorber Face Pressure
The acceptable operating range for this parameter is 0.25" to –2.0" w.c. The averages and ranges of all three runs fell within the acceptable operating range.

Thermal Desorber Shell Zone Temperature Setpoints
The acceptable shell temperature setpoint range is between 1000°F and 1650°F. The following zone set temperature ranges are used as an operating guideline based on actual treatment experience to achieve acceptable shell and soil exit temperatures:

- Zone 1 – 1200 to 1450 °F
- Zone 2 – 1300 to 1650 °F
- Zone 3 – 1300 to 1650 °F

The setpoint averages for of all three runs were maintained within these guidelines.

Soil Exit Temperature
The acceptable operating range for this parameter is 875°F to 1050°F. The target range for soil exit temperature is 925°F to 950°F. The averages for the three runs were 957.6°F, 927.6°F and 979.5°F. Based on untreated soil data analyses, the goal was to keep this value at the upper target range limit to meet the clean soil criteria. All temperatures fell within the acceptable operating range temperatures except for Day 3. On that day there was an approximate 24 minute period which exceeded the 1050°F operating range limit. The cause was traced to soil feed interruption due to bridging. Material bridging in the feed hopper causes the soil within the unit to reach elevated temperatures due to lack of colder material entering the calciner for treatment. Concurrent with system upsets, there is a recovery period required to restore process equilibrium. This type of excursion would not have any adverse affect on stack or soil samples.

Hot Cyclone Temperature
The acceptable operating range for this parameter is 750°F to 1050°F. Please note that during a recent review of control data, a discrepancy in the Hot Cyclone inlet and outlet temperatures was detected. The tag IDs for the RD-INLETGASTEMP and the HC_INLETGASTEMP were reversed. This was immediately corrected. The averages reported herein reflect this correction. The averages for the three runs were 900.1°F, 890.7°F and 924.9°F and within the acceptable operating range.

Scrubber Outlet Percent Oxygen Level
The acceptable operating range for this parameter is 1.0 to 10.0 %. The averages for the three runs were 7.3%, 6.6%, 10.0% and within the acceptable range. Three excursions were recorded on Day 3 above the high limit that were approximately 6, 30 and 30 minutes in length. The second event occurred during the feed interruption event. The other two events were traced to troubleshooting and repairing of the Gas Conditioning/O_2 Analyzing System caused by the high amount of organics and moisture being drawn through the sample lines. When the O_2 level exceeds 10.0, the high voltage faults. The only effect this would have on the VRS system and stack samples would be a decreased efficiency by the WESP to remove submicron particles. This condition does not affect soil treatment.

Scrubber Recycle Liquid Temperature
The acceptable operating range for this parameter is 50°F to 135°F (24-hr average) and 150°F maximum. The averages for the three runs were 120.2°F, 131.3°F, 129.0°F and within the acceptable range criteria.

ORIGINAL (Red)

Cooling Tower Outlet Water Temperature
The acceptable operating range for this parameter is 70°F to 120°F. The averages for the three runs were 100.6°F, 100.5°F, 96.8°F and within the acceptable operating range.

WESP Gas Exit Temperature
The acceptable operating range for this parameter is 50°F to 135°F (24 hr average) and 150°F maximum. The averages for the three runs were 110.3°F, 133.7°F and 126.5.0°F. Day 3 had temperatures which exceeded high temperature limit for the last 24 minutes. At the conclusion of the test, troubleshooting of the VRS system subsequently revealed that the lack of cooling was caused by clogging of the spray nozzles in the Quencher, Rod Deck Scrubber and the WESP. The obstruction was a result of valve seat elastomer chemical and heat deterioration.

FTO Bed Temperatures
The acceptable operating range for this parameter is 1500°F to 1800°F. The paired bed averages for the three runs were 1616.1/1620.3°F, 1755.3/1755.4°F, 1605.0/1606.2°F and within the acceptable range.

CPM Total Hydrocarbon Level
The acceptable maximum for this parameter is 800 PPM. The averages for the three runs were 260.7 PPM, 250.0 PPM and 284.3 PPM. There was a 5 minute period that was recorded as a negative value that was due to a CPM calibration performed at the beginning of the test.

Table B-1: Summary of Continuous Test Operational Parameters
POP II Averages, Minimum and Maximum Values

PROCESS PARAMETERS	Day 1 AVG	Day 1 MIN	Day 1 MAX	Day 2 AVG	Day 2 MIN	Day 2 MAX	Day 3 AVG	Day 3 MIN	Day 3 MAX
Soil Feed Rate Setpoint	40.0	40	40	51.5	36	56	53.0	48	63
Thermal Desorber Face Pressure	-0.27	-0.48	-0.04	-0.19	-0.39	-0.01	-0.17	-0.39	0.09
Thermal Desorber Shell Zone 1 Temp. Setpoint	1394.3	1387	1422	1378.6	1367	1467	1384.7	1367	1487
Thermal Desorber Shell Zone 2 Temp. Setpoint	1587.4	1583	1598	1596.6	1558	1608	1591.6	1578	1613
Thermal Desorber Shell Zone 3 Temp. Setpoint	1607.0	1603	1608	1604.7	1563	1613	1608.0	1608	1608
Soil Exit Temperature	957.6	941	976	927.6	864	976	979.5	890	1113
Hot Cyclone Temperature	900.1	885	916	890.7	846	919	924.9	868	982
Scrubber Outlet Percent Oxygen Level	7.3	6	9	6.6	5	9	10.0	5	22
Scrubber Recycle Liquid Temperature	120.2	118	122	131.3	127	138	129.0	120	137
Cooling Tower Outlet Water Temperature	100.6	99	102	100.5	99	104	96.8	94	101
WESP Gas Exit Temperature	110.3	106	113	133.7	124	141	126.5	117	161
FTO Bed 1 Temperature	1616.1	1565	1669	1755.3	1688	1802	1605.0	1569	1632
FTO Bed 2 Temperature	1620.3	1576	1666	1755.4	1710	1782	1606.2	1585	1631
CPM Total Hydrocarbon Level	260.7	-53.2	430.0	250.0	101.4	336.3	284.3	124.3	472.4

Tagname	Time 14:58	15.04	15:10	15:16	15:22	15:28	15:34	15:40	15:46	15:52	15:58	16:04	16:10	16:16	16:22	16:28	16:34	16:40	16:46	16:52	16:58	17:04	17:10	17:16	17:22	17:28	17.34	17:40
FTO2\BYPASS_RUNTIME	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CPMS_LEVEL	-5.32	-5.21	28.68	23.94	24.59	24.03	24.04	27.63	27.84	41.14	27.34	29.39	33.5	26.37	31.02	33.78	32.72	27.14	31.46	32.58	43	30.67	33.57	28.51	34.39	26.12	20.64	23.79
FTO2\TE101	92	93	94	93	95	94	93	93	94	94	94	95	95	93	94	95	94	91	91	91	89	88	89	88	89	87	87	87
FTO2\TE105	180	176	208	165	220	162	194	176	180	190	173	240	162	197	166	206	166	195	188	172	193	169	240	155	181	183	199	162
FTO2\TE106	187	211	110	129	288	156	107	175	216	112	114	323	165	104	142	266	129	104	199	208	107	112	334	164	128	107	233	192
FTO2\TE107	115	113	251	140	107	136	229	119	115	217	185	106	129	241	135	112	163	239	115	111	228	173	100	121	191	207	107	109
FTO2\TE108	1580	1579	1597	1581	1566	1584	1591	1572	1573	1596	1589	1565	1588	1604	1588	1580	1606	1613	1591	1597	1624	1615	1591	1616	1630	1631	1612	1625
FTO2\TE109	1596	1590	1576	1588	1596	1581	1578	1592	1589	1577	1585	1603	1590	1585	1600	1606	1595	1596	1615	1613	1601	1612	1630	1620	1613	1619	1640	1637
TDU2\CYL_DRIVE_AMPS	13	14	12	13	14	13	13	12	14	13	14	12	13	12	13	13	14	12	13	13	13	13	12	14	14	14	13	12
TDU2\CYL_DRIVE_RPM	3.09	3.11	3.11	3.22	3.21	3.14	3.13	3.13	3.1	3.1	3.21	3.23	3.14	3.14	3.13	3.11	1.58	3.22	3.21	3.21	3.14	3.14	3.14	3.11	3.14	3.09	3.21	3.21
TDU2\CYL_FEED_SPEED_SET	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
TDU2\FEEDSCREW_RUNTIME	703	709	715	721	727	733	739	745	751	757	763	769	775	781	787	793	799	805	811	817	823	829	835	841	847	853	859	865
TDU2\OXYGEN_DISCHARGE	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73
TDU2\PURGE_DAMPER	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.32	-0.35	-0.29	-0.33	-0.34	-0.24	-0.37	-0.26	-0.28	-0.32	-0.45	-0.35	-0.31	-0.48	-0.42	-0.17	-0.27	-0.23	-0.35	-0.12	-0.12	-0.19	-0.39	-0.29	-0.2	-0.36	-0.22	-0.41
TDU2\TE_10_TEMP	1617	1617	1619	1619	1621	1624	1623	1624	1625	1625	1626	1625	1623	1625	1624	1622	1624	1625	1624	1623	1623	1621	1619	1619	1617	1615	1616	1613
TDU2\TE_11_TEMP	1579	1579	1579	1581	1584	1588	1589	1591	1589	1590	1591	1592	1592	1593	1593	1592	1592	1590	1590	1589	1588	1587	1585	1582	1579	1579	1580	1575
TDU2\TE_12_TEMP	1478	1476	1479	1484	1490	1495	1499	1495	1494	1496	1497	1504	1508	1504	1506	1505	1498	1498	1495	1494	1493	1491	1487	1480	1483	1485	1477	1474
TDU2\TE_13_TEMP	1263	1259	1257	1265	1267	1271	1282	1276	1274	1277	1275	1285	1293	1287	1291	1291	1278	1274	1279	1273	1269	1273	1269	1256	1259	1266	1257	1251
TDU2\TE_14_TEMP	953	953	942	956	957	953	964	958	962	976	969	973	976	967	967	976	964	963	975	970	960	965	964	953	959	971	964	948
TDU2\TE_15_TEMP	212	211	211	212	212	212	212	209	211	208	207	210	210	209	210	209	207	208	208	209	209	207	207	207	208	209	207	206
TDU2\TE_16_TEMP	1573	1557	1571	1572	1551	1607	1569	1569	1573	1532	1553	1564	1581	1542	1533	1549	1581	1522	1546	1549	1564	1570	1543	1590	1581	1585	1541	1538
TDU2\TE_17_TEMP	1705	1573	1709	1700	1573	1713	1632	1582	1723	1592	1621	1724	1578	1651	1724	1584	1563	1712	1661	1566	1709	1727	1574	1653	1726	1590	1557	1712
TDU2\TE_18_TEMP	1591	1585	1585	1597	1584	1592	1592	1581	1596	1578	1576	1597	1583	1591	1589	1580	1570	1586	1584	1581	1596	1587	1573	1577	1586	1579	1549	1579
TDU2\TE_1_TEMP	1122	1112	1114	1117	1100	1113	1125	1115	1123	1112	1095	1101	1095	1084	1089	1091	1084	1089	1095	1089	1088	1099	1088	1089	1099	1095	1078	1082
TDU2\TE_2_TEMP	1407	1405	1409	1405	1397	1415	1421	1416	1415	1400	1396	1397	1408	1392	1387	1395	1404	1392	1390	1396	1392	1389	1387	1399	1396	1400	1383	1384
TDU2\TE_3_TEMP	1632	1618	1620	1628	1609	1620	1630	1617	1628	1622	1607	1613	1608	1600	1608	1613	1605	1609	1618	1607	1607	1620	1608	1607	1613	1610	1593	1595
TDU2\TE_4_TEMP	1723	1726	1720	1719	1716	1715	1722	1725	1723	1719	1713	1702	1707	1706	1698	1711	1718	1709	1714	1717	1711	1713	1715	1720	1710	1712	1707	1699
TDU2\TE_5_TEMP	1643	1639	1632	1637	1629	1627	1636	1634	1635	1637	1625	1626	1630	1619	1623	1631	1627	1623	1634	1631	1624	1634	1633	1625	1629	1637	1627	1620
TDU2\TE_6_TEMP	1603	1599	1586	1597	1593	1584	1599	1594	1594	1606	1591	1590	1597	1580	1584	1596	1584	1576	1594	1593	1579	1594	1597	1581	1586	1601	1588	1576
TDU2\TE_7_TEMP	1544	1525	1512	1536	1520	1519	1540	1520	1528	1541	1516	1532	1536	1508	1528	1536	1506	1506	1537	1522	1510	1541	1536	1507	1529	1545	1515	1508
TDU2\TE_8_TEMP	1558	1539	1538	1554	1539	1545	1556	1540	1552	1556	1540	1554	1549	1534	1551	1550	1530	1538	1554	1538	1538	1559	1547	1531	1550	1553	1531	1533
TDU2\TE_9_TEMP	1611	1616	1617	1614	1621	1621	1618	1624	1622	1622	1627	1622	1622	1626	1621	1621	1628	1626	1621	1624	1625	1618	1620	1623	1617	1616	1619	1614
TDU2\TOTAL_TONS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TDU2\ZONE1_TEMP_SET	1407	1407	1407	1402	1402	1417	1422	1422	1412	1397	1397	1397	1397	1397	1397	1397	1397	1397	1392	1392	1392	1392	1392	1392	1392	1392	1387	1387
TDU2\ZONE2_TEMP_SET	1593	1593	1598	1593	1593	1593	1598	1598	1593	1598	1598	1588	1588	1588	1583	1583	1583	1583	1583	1588	1588	1588	1588	1588	1588	1588	1583	1588
TDU2\ZONE3_TEMP_SET	1603	1603	1603	1603	1603	1603	1603	1603	1603	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
VRS2\CT_LIQUIDOUTLETTEMP	101	101	101	101	101	101	102	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	100	100	100	100	100
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-5	-4	-4	-5	-4	-4	-5	-4	-4	-4	-4	-5	-4	-4	-4	-5	-4	-3	-5	-4	-5	-4	-4	-4	-4	-4	-4	-4
VRS2\HC_INLETGASTEMP	857	853	850	856	856	855	864	859	865	870	867	872	875	868	871	874	868	866	871	867	864	868	865	857	862	865	855	851
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
VRS2\ID_OUTLETPRES	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	2	1	2	2	2	1	2	2	2	2	2
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	899	895	890	897	897	895	904	902	905	913	909	912	916	910	912	916	910	908	915	910	906	910	908	899	903	909	902	895
VRS2\RD_OXYGEN	7	7	7	7	6	7	7	6	6	6	6	7	6	6	6	6	6	7	7	7	7	7	7	7	7	7	8	9
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	121	121	121	122	122	122	122	122	121	121	121	121	121	121	121	121	121	120	120	120	120	120	120	120	120	119	119	119
VRS2\WESP_CURRENT_AMP	3	2	2	1	2	1	1	1	1	2	1	2	1	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	-60	100	1081	654	-48	1475	95	1071	19	1616	149	-28	42	-119	-222	670	2095	112	-10	130	265	204	169	163	1388	76	108	158
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASTEMP	112	111	113	113	113	113	113	113	113	113	113	113	113	112	113	113	113	112	112	111	111	110	110	110	110	110	110	110
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	14	19	19	19	19	18	19	19	19	18	19	19	19	18	19	18	18	19	19	19	19	19	19	19	14	17	18	17

ORIGINAL (Red)

Continuous Unit [illegible] r April 13, 1999

Tagname	Time 17:46	17:52	17:58	18:04	18:10	18:16	18:22	18:28	18:34	18:40	18:46	18:52	18:58	19:04	19:10	19:16	19:22	19:28	19:34
FTO2\BYPASS_RUNTIME	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CPMS_LEVEL	26.56	31.83	14.58	21.44	26.41	21 68	21.54	27.61	28.11	20.55	19.33	26.61	40.46	20.9	27.18	26.79	18.86	19.59	27.84
FTO2\TE101	87	86	83	84	84	83	83	84	83	82	83	84	83	82	83	84	82	82	84
FTO2\TE105	174	228	156	190	158	202	165	179	165	188	191	162	203	162	205	158	196	172	178
FTO2\TE106	196	109	113	249	174	97	151	231	124	102	222	190	102	123	279	147	96	168	226
FTO2\TE107	127	280	138	97	119	253	119	100	168	220	106	108	249	143	97	135	241	113	102
FTO2\TE108	*1628*	*1650*	*1643*	*1626*	*1642*	*1658*	*1638*	*1633*	*1657*	*1658*	*1634*	*1644*	*1669*	*1651*	*1633*	*1655*	*1666*	*1644*	*1642*
FTO2\TE109	1633	1620	1638	1654	1642	1635	1652	1656	1643	1644	1661	1656	1641	1656	1666	1653	1648	1665	1666
TDU2\CYL_DRIVE_AMPS	13	13	13	12	14	14	12	13	12	13	13	14	13	13	14	13	13	14	13
TDU2\CYL_DRIVE_RPM	3.15	3.16	3.13	3.12	3.11	3.23	3.23	3.16	3.14	3.16	3.14	3.12	3.12	3.11	3.23	3.21	3.16	3.14	3.12
TDU2\CYL_FEED_SPEED_SET	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
TDU2\FEEDSCREW_RUNTIME	871	877	883	889	895	901	907	913	919	925	931	937	943	949	955	961	967	973	979
TDU2\OXYGEN_DISCHARGE	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73
TDU2\PURGE_DAMPER	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.35	-0.28	-0.47	-0.24	-0.13	-0.09	-0.31	-0.21	-0.04	-0.26	-0.14	-0.21	-0.39	-0.19	-0.21	-0.24	-0.2	-0.14	-0.33
TDU2\TE_10_TEMP	1609	1608	1610	1610	1609	1612	1612	1610	1611	1613	1612	1612	1615	1614	1612	1612	1612	1611	1614
TDU2\TE_11_TEMP	1572	1571	1571	1571	1570	1571	1573	1572	1572	1573	1573	1574	1576	1577	1576	1575	1574	1574	1577
TDU2\TE_12_TEMP	1473	1472	1468	1463	1468	1469	1467	1469	1468	1470	1473	1476	1480	1482	1482	1476	1476	1480	1484
TDU2\TE_13_TEMP	1254	1250	1240	1240	1240	1238	1241	1241	1235	1237	1246	1246	1248	1258	1258	1247	1246	1254	1254
TDU2\TE_14_TEMP	953	955	946	949	951	944	948	954	947	946	956	951	944	948	948	941	946	960	963
TDU2\TE_15_TEMP	209	209	205	204	208	210	207	209	207	207	207	205	207	208	209	207	207	208	210
TDU2\TE_16_TEMP	1582	1507	1589	1561	1537	1551	1574	1535	1546	1564	1492	1550	1522	1539	1530	1569	1570	1567	1541
TDU2\TE_17_TEMP	1731	1568	1643	1724	1569	1657	1723	1582	1562	1715	1653	1560	1702	1724	1571	1564	1719	1611	1561
TDU2\TE_18_TEMP	1581	1574	1568	1573	1564	1580	1584	1570	1570	1577	1578	1567	1578	1580	1559	1562	1579	1569	1573
TDU2\TE_1_TEMP	1093	1085	1083	1087	1082	1076	1084	1085	1079	1085	1089	1078	1075	1082	1083	1075	1086	1087	1073
TDU2\TE_2_TEMP	1391	1382	1397	1384	1388	1386	1388	1386	1387	1383	1379	1387	1379	1378	1388	1392	1391	1392	1387
TDU2\TE_3_TEMP	1614	1603	1598	1609	1602	1598	1613	1615	1601	1609	1611	1601	1601	1608	1609	1600	1612	1610	1600
TDU2\TE_4_TEMP	1706	1708	1712	1711	1711	1709	1712	1720	1718	1713	1709	1710	1701	1696	1707	1712	1710	1710	1709
TDU2\TE_5_TEMP	1633	1631	1623	1629	1628	1617	1626	1633	1625	1622	1629	1625	1615	1623	1628	1622	1624	1633	1626
TDU2\TE_6_TEMP	1593	1598	1581	1587	1592	1576	1583	1597	1583	1576	1593	1588	1573	1584	1594	1579	1579	1596	1589
TDU2\TE_7_TEMP	1541	1535	1504	1524	1524	1500	1523	1535	1506	1506	1537	1519	1506	1534	1538	1504	1515	1540	1520
TDU2\TE_8_TEMP	1555	1545	1527	1545	1537	1527	1545	1547	1527	1535	1553	1536	1536	1555	1549	1526	1540	1552	1538
TDU2\TE_9_TEMP	1607	1610	1615	1611	1613	1617	1613	1613	1618	1617	1613	1618	1620	1615	1615	1620	1617	1614	1622
TDU2\TOTAL_TONS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TDU2\ZONE1_TEMP_SET	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387
TDU2\ZONE2_TEMP_SET	1588	1588	1588	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583
TDU2\ZONE3_TEMP_SET	*1608*	*1608*	*1608*	*1608*	*1608*	*1608*	*1608*	*1608*	*1608*	*1608*	*1608*	1608	1608	1608	1608	1608	1608	1608	1608
VRS2\CT_LIQUIDOUTLETTEMP	100	101	100	100	100	100	100	101	101	100	100	100	100	101	101	100	100	100	99
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-4	-5	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-3	-3
VRS2\HC_INLETGASTEMP	857	854	845	848	852	846	849	852	847	848	855	850	846	851	851	844	848	855	856
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
VRS2\ID_OUTLETPRES	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	3
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	899	899	892	894	895	888	892	896	890	889	897	892	886	891	892	885	888	898	897
VRS2\RD_OXYGEN	8	8	8	8	8	8	8	8	8	8	8	8	8	9	8	8	9	8	8
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	120	120	119	119	120	119	120	120	120	120	120	120	119	120	120	119	119	118	118
VRS2\WESP_CURRENT_AMP	1	1	1	1	2	2	1	1	1	1	1	1	2	2	1	1	1	1	1
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	1583	-59	83	-3	79	126	882	1669	1884	326	-35	-12	385	112	1583	85	1254	1225	1097
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASTEMP	110	110	108	108	108	109	108	108	108	108	107	108	108	107	107	108	107	107	106
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	18	19	18	17	17	19	17	19	18	18	18	18	16	19	18	19	19	19	18

ORIGINAL (Red)

Tagname	Time 16.52	16:58	17:04	17:10	17:16	17:22	17:28	17:34	17:40	17:46	17:52	17:58	18:04	18:10	18:16	18:22	18:28	18:34	18:40	18:46	18:52	18 58	19:04	19:10	19:16	19 22	19 28	19:34
FTO2\BYPASS_RUNTIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CFMS_LEVEL	30 54	10.14	19.5	25.55	23.22	16.36	11.89	16.61	27.76	32.36	16.06	25.88	33.63	25.76	13.55	23.42	29.38	26.67	23.06	27.23	27.86	17.16	26.1	31.15	29.96	24 24	28.18	29.36
FTO2\TE101	87	85	92	94	95	97	97	98	98	100	98	99	101	101	98	97	96	95	92	92	93	92	93	95	95	92	92	95
FTO2\TE105	231	173	175	204	184	176	199	204	171	193	185	182	204	176	230	171	201	175	186	195	177	212	178	227	172	190	176	193
FTO2\TE106	127	121	164	185	227	127	114	242	201	143	120	142	217	184	107	137	259	139	115	219	199	105	126	295	154	112	167	231
FTO2\TE107	253	150	134	153	116	172	219	118	120	192	182	169	134	132	281	149	109	165	194	116	123	249	172	108	148	205	132	117
FTO2\TE108	1781	1776	1774	1772	1773	1795	1797	1775	1783	1794	1791	1786	1771	1780	1802	1780	1763	1784	1780	1758	1763	1781	1766	1740	1760	1763	1745	1737
FTO2\TE109	1750	1759	1764	1763	1768	1763	1766	1779	1776	1768	1773	1775	1778	1773	1764	1777	1782	1769	1769	1779	1770	1758	1764	1772	1757	1754	1761	1757
TDU2\CYL_DRIVE_AMPS	10	11	12	10	10	10	10	11	11	11	10	11	10	10	9	9	10	10	10	12	10	10	12	11	12	11	11	10
TDU2\CYL_DRIVE_RPM	3 14	3.23	3.15	3.14	3.14	3.09	3.16	3.11	3.12	3.22	3.23	3.15	3.16	3.08	3.15	3.11	3.16	3.13	3.19	3.23	3.24	3.16	3.17	3.17	3.12	3.17	3.18	3.18
TDU2\CYL_FEED_SPEED_SET	55	55	55	55	55	55	55	50	50	50	50	45	45	45	45	45	48	48	48	48	48	48	48	53	53	53	53	53
TDU2\FEEDSCREW_RUNTIME	1013	1019	1025	1031	1037	1043	1049	1055	1061	1067	1073	1079	1085	1091	1097	1103	1109	1115	1121	1127	1133	1139	1145	1151	1157	1163	1169	1175
TDU2\OXYGEN_DISCHARGE	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	21.73	0.02	0.02	0.02	0.02	0.02	0 02	0.02	0 02	0 02	0.02
TDU2\PURGE_DAMPER	25	25	25	35	35	35	35	35	35	35	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.05	-0.26	-0.17	-0.01	-0.23	-0.04	-0.27	-0.11	-0.08	-0.15	-0.36	-0.15	-0.24	-0.24	-0.09	-0.3	-0.13	-0.27	-0.26	-0.3	-0.25	-0.25	-0.15	-0.38	-0.39	-0 14	-0.15	-0.16
TDU2\TE_10_TEMP	1602	1601	1603	1611	1613	1613	1621	1625	1622	1623	1622	1613	1603	1598	1591	1583	1579	1573	1565	1559	1559	1560	1562	1568	1575	1576	1573	1574
TDU2\TE_11_TEMP	1555	1559	1562	1566	1569	1571	1577	1584	1589	1588	1582	1574	1566	1556	1542	1532	1526	1518	1509	1507	1505	1503	1507	1516	1522	1525	1526	1526
TDU2\TE_12_TEMP	1450	1457	1460	1460	1462	1466	1476	1491	1489	1480	1470	1464	1455	1434	1415	1407	1397	1388	1384	1386	1384	1385	1398	1409	1412	1415	1412	1421
TDU2\TE_13_TEMP	1217	1227	1228	1223	1229	1230	1233	1254	1268	1260	1252	1255	1250	1233	1215	1208	1202	1194	1194	1194	1188	1183	1193	1200	1200	1206	1205	1200
TDU2\TE_14_TEMP	877	894	898	891	906	918	931	949	967	967	960	967	971	962	958	974	976	961	952	956	943	933	952	955	942	931	925	915
TDU2\TE_15_TEMP	202	204	202	202	205	203	204	205	205	205	207	207	205	205	201	205	204	206	201	200	200	200	201	202	201	201	200	203
TDU2\TE_16_TEMP	1585	1562	1547	1607	1589	1537	1540	1556	1562	1466	1592	1538	1537	1541	1549	1441	1501	1545	1506	1506	1537	1524	1535	1525	1525	1521	1512	1510
TDU2\TE_17_TEMP	1778	1707	1611	1752	1791	1617	1669	1797	1635	1585	1740	1801	1610	1587	1639	1636	1580	1577	1800	1600	1579	1772	1677	1592	1636	1800	1607	1582
TDU2\TE_18_TEMP	1573	1573	1565	1581	1591	1585	1595	1608	1578	1546	1559	1550	1523	1499	1505	1510	1480	1471	1500	1490	1480	1524	1517	1510	1525	1534	1509	1542
TDU2\TE_1_TEMP	1108	1114	1099	1105	1119	1106	1097	1106	1108	1089	1091	1091	1083	1072	1066	1073	1068	1059	1064	1061	1057	1060	1066	1058	1051	1064	1063	1056
TDU2\TE_2_TEMP	1393	1392	1389	1403	1399	1385	1387	1386	1394	1373	1394	1380	1382	1375	1371	1362	1363	1372	1362	1360	1365	1365	1368	1368	1366	1364	1366	1365
TDU2\TE_3_TEMP	1612	1619	1610	1613	1621	1605	1595	1603	1602	1580	1583	1593	1589	1579	1576	1580	1572	1566	1576	1577	1568	1571	1581	1574	1572	1583	1584	1575
TDU2\TE_4_TEMP	1709	1709	1714	1718	1715	1715	1711	1703	1712	1703	1704	1696	1705	1708	1710	1708	1707	1706	1696	1700	1700	1695	1696	1697	1697	1690	1695	1696
TDU2\TE_5_TEMP	1616	1622	1619	1617	1624	1624	1615	1618	1631	1622	1615	1620	1626	1626	1624	1626	1626	1623	1619	1625	1621	1614	1620	1619	1610	1611	1617	1611
TDU2\TE_6_TEMP	1595	1615	1610	1595	1611	1614	1596	1603	1621	1608	1591	1606	1615	1602	1590	1602	1603	1590	1595	1610	1598	1587	1607	1606	1587	1593	1608	1594
TDU2\TE_7_TEMP	1554	1594	1570	1544	1583	1577	1541	1571	1594	1559	1534	1582	1584	1546	1517	1549	1548	1519	1550	1576	1543	1532	1579	1566	1527	1564	1588	1546
TDU2\TE_8_TEMP	1567	1591	1577	1564	1591	1586	1566	1586	1597	1574	1559	1593	1586	1558	1537	1565	1556	1531	1557	1570	1546	1544	1579	1569	1544	1571	1582	1556
TDU2\TE_9_TEMP	1602	1591	1606	1616	1606	1615	1630	1618	1613	1620	1619	1602	1599	1597	1591	1582	1579	1575	1563	1561	1566	1566	1566	1576	1584	1577	1573	1585
TDU2\TOTAL_TONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TDU2\ZONE1_TEMP_SET	1392	1392	1392	1392	1392	1392	1392	1392	1392	1382	1382	1382	1382	1372	1372	1372	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367
TDU2\ZONE2_TEMP_SET	1603	1603	1603	1603	1603	1603	1603	1603	1603	1598	1598	1598	1598	1593	1593	1593	1593	1593	1593	1593	1593	1593	1593	1593	1593	1593	1593	1593
TDU2\ZONE3_TEMP_SET	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
VRS2\CT_LIQUIDOUTLETTEMP	103	103	104	103	103	103	102	102	102	102	101	101	101	100	99	99	99	99	99	99	99	99	99	99	99	99	100	100
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-7	-4	-4	-6	-6	-5	-4	-5	-6	-6	-4	-4	-5	-6	-5	-4	-4	-3	-3	-5	-4	-3	-3	-3	-5	-4	-4	-4
VRS2\HC_INLETGASTEMP	848	860	854	845	857	853	851	863	874	872	868	878	878	870	865	876	874	869	869	869	860	855	867	865	857	864	855	845
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	50	50	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
VRS2\ID_OUTLETPRES	1	1	2	1	0	0	0	0	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	880	892	888	883	895	893	890	903	915	913	908	917	919	913	909	919	918	910	908	910	900	894	905	904	896	896	893	882
VRS2\RD_OXYGEN	8	9	8	7	7	6	6	6	6	5	5	6	5	5	5	5	5	5	5	5	6	6	6	6	6	7	7	7
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	136	137	138	136	136	136	135	135	134	133	132	132	131	130	128	128	127	127	128	128	128	128	129	129	129	130	131	131
VRS2\WESP_CURRENT_AMP	2	3	3	2	3	4	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	-241	-241	-219	-241	1669	2654	1499	1814	3914	5932	-12	5678	7694	7959	7959	7959	7959	7959	7486	7959	7959	7518	6374	6860	7959	6509	6555	7212
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASTEMP	128	132	136	138	138	141	141	141	139	139	138	138	138	135	132	128	125	124	124	124	126	127	128	130	130	131	134	136
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	11	12	13	13	12	14	14	16	16	17	17	19	18	18	18	19	19	18	18	18	18	19	18	18	17	17	16	16

Tagname	Time 19:40	19:46	19:52	19:58	20:04	20:10	20:16	20:22	20:28	20:34	20:40	20:46	20:52	20:58	21:04
FTO2\BYPASS_RUNTIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CPMS_LEVEL	31.06	27.03	32.61	30.85	22.23	26.47	27.79	26.48	24.06	26.82	27.04	29.57	22.85	24.84	22.76
FTO2\TE101	94	95	95	95	94	94	95	94	92	94	95	92	89	90	89
FTO2\TE105	191	199	221	174	210	175	214	176	176	178	211	200	177	200	171
FTO2\TE106	120	116	264	187	108	141	270	140	116	177	260	130	124	236	183
FTO2\TE107	204	221	114	126	251	153	110	163	179	128	115	209	168	108	123
FTO2\TE108	1755	1749	1720	1731	1746	1728	1710	1730	1726	1710	1698	1716	1706	1688	1695
FTO2\TE109	1743	1743	1756	1744	1733	1741	1745	1729	1731	1735	1730	1710	1717	1726	1711
TDU2\CYL_DRIVE_AMPS	10	11	10	10	11	12	12	11	12	12	11	12	11	12	11
TDU2\CYL_DRIVE_RPM	3.17	3.26	3.24	3.17	3.11	3.11	3.16	3.12	3.23	3.16	3.25	3.24	3.16	3.16	3.17
TDU2\CYL_FEED_SPEED_SET	53	53	53	53	53	56	56	56	56	56	56	56	56	56	36
TDU2\FEEDSCREW_RUNTIME	1181	1187	1193	1199	1205	1211	1217	1223	1229	1235	1241	1247	1253	1259	1265
TDU2\OXYGEN_DISCHARGE	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TDU2\PURGE_DAMPER	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.31	-0.21	-0.16	-0.13	-0.08	-0.2	-0.22	-0.15	-0.08	-0.21	-0.21	-0.21	-0.19	-0.07	-0.29
TDU2\TE_10_TEMP	1582	1588	1595	1598	1582	1552	1527	1520	1529	1543	1557	1569	1570	1564	1568
TDU2\TE_11_TEMP	1533	1543	1554	1555	1536	1506	1474	1459	1468	1485	1498	1516	1520	1513	1521
TDU2\TE_12_TEMP	1434	1450	1461	1438	1398	1361	1340	1347	1369	1384	1406	1419	1408	1416	1439
TDU2\TE_13_TEMP	1206	1226	1236	1225	1204	1176	1147	1137	1145	1151	1162	1182	1180	1180	1201
TDU2\TE_14_TEMP	920	947	956	936	909	898	877	864	883	882	885	912	897	885	906
TDU2\TE_15_TEMP	201	199	195	194	194	194	195	190	191	193	194	200	204	205	203
TDU2\TE_16_TEMP	1531	1515	1531	1529	1529	1521	1522	1527	1521	1529	1538	1570	1557	1606	1373
TDU2\TE_17_TEMP	1790	1791	1606	1572	1799	1581	1567	1799	1617	1577	1795	1619	1562	1689	1577
TDU2\TE_18_TEMP	1563	1574	1549	1480	1452	1401	1443	1516	1505	1512	1556	1490	1508	1549	1531
TDU2\TE_1_TEMP	1063	1069	1059	1049	1053	1046	1039	1045	1045	1038	1043	1046	1043	1060	1078
TDU2\TE_2_TEMP	1367	1361	1369	1368	1367	1368	1368	1367	1367	1367	1367	1385	1396	1417	1400
TDU2\TE_3_TEMP	1582	1589	1579	1570	1575	1571	1566	1573	1576	1571	1575	1577	1575	1596	1599
TDU2\TE_4_TEMP	1690	1685	1692	1695	1695	1698	1697	1689	1690	1693	1689	1693	1709	1721	1711
TDU2\TE_5_TEMP	1608	1616	1619	1620	1631	1642	1634	1635	1649	1639	1636	1652	1648	1633	1616
TDU2\TE_6_TEMP	1589	1613	1614	1596	1596	1610	1596	1593	1619	1609	1599	1623	1613	1589	1583
TDU2\TE_7_TEMP	1554	1609	1591	1543	1537	1544	1514	1515	1549	1528	1524	1556	1533	1505	1514
TDU2\TE_8_TEMP	1566	1604	1590	1551	1542	1533	1504	1512	1537	1527	1533	1552	1522	1507	1516
TDU2\TE_9_TEMP	1590	1589	1602	1599	1574	1548	1533	1531	1541	1558	1571	1576	1572	1571	1568
TDU2\TOTAL_TONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TDU2\ZONE1_TEMP_SET	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1417	1417	1467	1367
TDU2\ZONE2_TEMP_SET	1603	1603	1593	1593	1593	1593	1593	1598	1598	1598	1603	1603	1603	1608	1558
TDU2\ZONE3_TEMP_SET	1608	1608	1608	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1613	1563
VRS2\CT_LIQUIDOUTLETTEMP	100	101	101	100	100	100	100	100	100	100	101	101	101	100	100
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-4	-4	-4	-4	-4	-4	-4	-4	-4	-5	-5	-4	-6	-5	-5
VRS2\HC_INLETGASTEMP	847	861	864	855	844	837	820	813	825	821	822	836	825	818	832
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
VRS2\ID_OUTLETPRES	2	1	1	1	2	1	2	2	1	2	2	2	2	2	1
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	883	899	902	895	882	873	854	846	858	854	854	870	859	852	865
VRS2\RD_OXYGEN	7	7	6	7	7	7	8	8	8	8	8	8	8	8	8
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	132	132	131	131	130	130	130	130	131	131	132	132	131	130	131
VRS2\WESP_CURRENT_AMP	2	2	1	1	1	2	1	1	2	1	1	1	1	1	1
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	5857	6828	7857	7959	7447	7959	7051	5583	5715	5865	4722	5903	6966	6017	5781
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASTEMP	137	137	137	136	135	134	133	133	135	137	137	136	135	134	133
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	15	17	16	17	17	17	18	18	16	17	18	18	17	17	18

ORIGINAL (Red)

Tagname	Time 7:40	7:46	7:52	7:58	8:04	8:10	8:16	8:22	8:28	8:34	8:40	8:46	8:52	8:58
FTO1\BYPASS_MEM														
FTO2\BYPASS_RUNTIME	56	56	56	56	56	56	56	56	56	56	56	56	56	56
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CPMS_LEVEL	33.97	32.41	38.26	32.24	20.87	34.5	33.01	32.13	32.68	18.9	27.05	31.11	42.43	35.15
FTO2\TE101	87	87	88	88	88	88	86	85	86	87	84	85	85	95
FTO2\TE105	166	191	160	201	180	169	190	174	227	160	185	172	224	169
FTO2\TE106	143	252	130	100	191	204	96	107	306	171	95	117	299	180
FTO2\TE107	130	98	153	254	113	109	233	191	99	118	223	179	102	129
FTO2\TE108	1623	1609	1615	1613	1594	1593	1606	1598	1575	1588	1600	1590	1569	1584
FTO2\TE109	1617	1614	1605	1599	1604	1599	1590	1592	1601	1592	1586	1588	1597	1587
TDU2\CYL_DRIVE_AMPS	13	12	10	13	12	10	11	11	10	11	13	12	11	11
TDU2\CYL_DRIVE_RPM	3.14	3.14	3.11	3.16	3.21	3.14	3.14	3.14	3.14	3.11	3.14	3.22	3.21	3.21
TDU2\CYL_FEED_SPEED_SET	48	48	48	48	48	48	48	48	48	48	48	48	48	48
TDU2\FEEDSCREW_RUNTIME	399	405	411	417	423	429	435	441	447	453	459	465	471	477
TDU2\OXYGEN_DISCHARGE	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TDU2\PURGE_DAMPER	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.09	-0.32	-0.39	-0.17	-0.15	-0.12	-0.12	-0.15	-0.09	-0.33	-0.32	-0.17	-0.18	-0.16
TDU2\TE_10_TEMP	1596	1595	1592	1589	1586	1586	1585	1580	1573	1566	1567	1571	1574	1580
TDU2\TE_11_TEMP	1576	1575	1573	1570	1567	1566	1565	1560	1550	1537	1539	1544	1549	1556
TDU2\TE_12_TEMP	1515	1513	1507	1502	1500	1499	1493	1478	1453	1456	1464	1473	1482	1481
TDU2\TE_13_TEMP	1340	1338	1333	1327	1322	1320	1317	1306	1277	1263	1270	1281	1292	1294
TDU2\TE_14_TEMP	984	984	972	972	978	986	995	994	968	954	966	974	991	1021
TDU2\TE_15_TEMP	218	215	222	221	217	216	216	215	216	214	216	218	214	215
TDU2\TE_16_TEMP	1529	1558	1522	1528	1527	1527	1536	1508	1529	1566	1541	1542	1554	1502
TDU2\TE_17_TEMP	1710	1706	1705	1707	1708	1710	1712	1585	1557	1696	1706	1710	1715	1584
TDU2\TE_18_TEMP	1564	1565	1561	1562	1562	1558	1544	1502	1489	1551	1549	1554	1557	1493
TDU2\TE_1_TEMP	1050	1056	1056	1057	1056	1057	1058	1045	1022	1038	1046	1052	1059	1044
TDU2\TE_2_TEMP	1368	1377	1371	1371	1371	1372	1374	1369	1372	1382	1378	1378	1380	1368
TDU2\TE_3_TEMP	1622	1625	1621	1621	1623	1626	1629	1618	1597	1613	1623	1629	1633	1622
TDU2\TE_4_TEMP	1693	1698	1695	1697	1700	1703	1707	1713	1720	1718	1714	1714	1714	1727
TDU2\TE_5_TEMP	1581	1580	1579	1580	1582	1585	1589	1595	1601	1593	1589	1589	1591	1611
TDU2\TE_6_TEMP	1577	1577	1575	1575	1577	1579	1582	1585	1573	1564	1567	1573	1580	1591
TDU2\TE_7_TEMP	1595	1595	1592	1591	1592	1593	1596	1586	1539	1532	1554	1572	1586	1579
TDU2\TE_8_TEMP	1589	1588	1586	1584	1584	1586	1587	1572	1528	1532	1551	1566	1579	1571
TDU2\TE_9_TEMP	1584	1584	1581	1578	1577	1577	1575	1570	1566	1561	1561	1564	1568	1577
TDU2\TOTAL_TONS	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TDU2\ZONE1_TEMP_SET	1367	1372	1372	1372	1372	1372	1372	1372	1372	1377	1377	1377	1377	1372
TDU2\ZONE2_TEMP_SET	1593	1593	1593	1593	1588	1588	1588	1578	1578	1578	1578	1578	1578	1583
TDU2\ZONE3_TEMP_SET	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
VRS2\CT_LIQUIDOUTLETTEMP	97	97	97	97	97	97	97	97	96	96	96	97	97	96
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-4	-4	-4	-4	-4	-4	-4	-4	-3	-4	-4	-4	-3	-2
VRS2\HC_INLETGASTEMP	903	902	898	897	899	903	907	908	896	889	892	896	905	903
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	45	45	45	45	45	45	45	45	45	45	45	45	45	45
VRS2\ID_OUTLETPRES	0	1	1	0	0	0	0	0	1	1	1	0	1	2
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	928	927	922	921	923	928	932	933	921	912	916	920	929	940
VRS2\RD_OXYGEN	6	7	8	8	8	9	8	9	10	11	8	10	12	14
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	129	129	131	131	130	130	129	129	130	130	131	131	132	125
VRS2\WESP_CURRENT_AMP	2	2	2	2	2	1	1	1	1	0	1	1	0	0
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASTEMP	125	124	127	128	127	127	125	126	127	128	127	128	129	132
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	16	16	15	15	15	16	17	17	17	0	17	17	0	0

Tagname	9:04	9:10	9:16	9:22	9:28	9:34	9:40	9:46	9:52	9:58	10:04	10:10	10:16	10:22
FTO1\BYPASS_MEM														
FTO2\BYPASS_RUNTIME	56	56	56	56	56	56	56	56	56	56	56	56	56	56
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CPMS_LEVEL	13	32.97	33.97	25.56	31.73	15.67	22.94	19.6	31.07	33.09	15.44	24.23	29.66	34.21
FTO2\TE101	90	88	86	84	84	83	82	82	83	83	80	83	86	86
FTO2\TE105	177	198	205	210	162	167	213	167	181	165	196	163	186	163
FTO2\TE106	102	109	120	258	184	157	96	154	238	175	95	132	247	129
FTO2\TE107	196	234	233	106	109	142	273	117	97	125	237	137	99	158
FTO2\TE108	1597	1598	1593	1578	1592	1600	1614	1599	1595	1607	1622	1610	1600	1624
FTO2\TE109	1586	1585	1585	1600	1599	1594	1590	1608	1614	1606	1601	1614	1623	1611
TDU2\CYL_DRIVE_AMPS	11	11	11	10	12	11	12	10	11	10	11	10	11	11
TDU2\CYL_DRIVE_RPM	3.13	3.14	3.13	3.13	3.1	3.21	3.11	3.21	3.13	3.14	3.14	3.13	3.11	3.1
TDU2\CYL_FEED_SPEED_SET	48	48	48	48	48	48	48	48	53	53	53	53	53	53
TDU2\FEEDSCREW_RUNTIME	483	489	495	501	507	513	519	525	531	537	543	549	555	561
TDU2\OXYGEN_DISCHARGE	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TDU2\PURGE_DAMPER	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.24	-0.1	-0.19	-0.28	-0.06	-0.16	-0.22	-0.18	-0.09	-0.28	-0.19	-0.15	-0.19	-0.13
TDU2\TE_10_TEMP	1588	1595	1594	1585	1572	1566	1562	1557	1552	1552	1556	1557	1551	1545
TDU2\TE_11_TEMP	1558	1561	1562	1558	1551	1546	1536	1527	1524	1527	1530	1526	1521	1518
TDU2\TE_12_TEMP	1479	1480	1477	1474	1469	1455	1439	1436	1439	1446	1438	1431	1427	1425
TDU2\TE_13_TEMP	1287	1287	1291	1300	1305	1293	1271	1262	1265	1271	1263	1251	1248	1247
TDU2\TE_14_TEMP	1095	1113	1073	1055	1048	1037	1009	995	1002	1012	994	964	959	960
TDU2\TE_15_TEMP	218	222	219	219	215	218	218	222	219	221	221	220	221	220
TDU2\TE_16_TEMP	1531	1523	1545	1533	1532	1522	1541	1533	1535	1529	1521	1591	1534	1551
TDU2\TE_17_TEMP	1572	1554	1691	1715	1713	1554	1608	1706	1716	1694	1544	1694	1708	1711
TDU2\TE_18_TEMP	1504	1508	1529	1527	1522	1481	1492	1517	1524	1524	1485	1513	1515	1513
TDU2\TE_1_TEMP	1024	1006	1010	1023	1035	1018	1004	1016	1030	1038	1019	1035	1046	1057
TDU2\TE_2_TEMP	1372	1371	1374	1373	1372	1372	1374	1372	1371	1371	1372	1394	1386	1389
TDU2\TE_3_TEMP	1601	1586	1598	1616	1627	1606	1597	1612	1625	1631	1605	1617	1629	1638
TDU2\TE_4_TEMP	1735	1735	1734	1728	1726	1733	1736	1728	1724	1724	1730	1734	1730	1728
TDU2\TE_5_TEMP	1629	1634	1624	1614	1610	1619	1620	1609	1604	1602	1609	1605	1599	1597
TDU2\TE_6_TEMP	1593	1585	1575	1578	1588	1589	1576	1572	1580	1588	1583	1571	1572	1578
TDU2\TE_7_TEMP	1551	1521	1509	1539	1572	1557	1518	1528	1559	1580	1552	1530	1547	1568
TDU2\TE_8_TEMP	1551	1522	1518	1542	1567	1542	1509	1523	1551	1569	1535	1525	1539	1556
TDU2\TE_9_TEMP	1590	1596	1589	1574	1563	1562	1560	1551	1548	1549	1555	1552	1544	1540
TDU2\TOTAL_TONS	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TDU2\ZONE1_TEMP_SET	1372	1372	1372	1372	1372	1372	1372	1372	1372	1372	1372	1387	1387	1387
TDU2\ZONE2_TEMP_SET	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1598	1598	1598
TDU2\ZONE3_TEMP_SET	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
VRS2\CT_LIQUIDOUTLETTEMP	94	94	94	95	95	95	95	95	95	95	96	96	96	97
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-4	-3	-3	-3
VRS2\HC_INLETGASTEMP	934	951	951	951	949	942	929	921	921	923	913	903	899	895
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	45	45	45	45	45	45	45	45	45	45	49	49	49	49
VRS2\ID_OUTLETPRES	1	1	1	0	1	1	1	1	1	1	1	1	1	1
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	967	982	981	980	978	971	958	950	950	951	941	928	924	920
VRS2\RD_OXYGEN	13	14	20	5	6	6	6	7	7	8	10	10	9	11
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	120	122	123	125	125	125	125	125	126	126	125	127	128	128
VRS2\WESP_CURRENT_AMP	0	0	0	1	1	1	1	1	1	1	1	1	0	0
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7959	7513
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASTEMP	125	121	118	117	117	118	118	117	118	118	117	121	124	126
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	0	0	0	18	18	17	18	18	18	18	18	17	0	0

ORIGINAL (Red)

Tagname	Time 10:28	10:34	10:40	10:46	10:52	10:58	11:04	11:10	11:16	11:22	11:28	11:34	11:40	11:46
FTO1\BYPASS_MEM														
FTO2\BYPASS_RUNTIME	56	56	56	56	56	56	56	56	56	56	56	56	56	56
FTO2\COMB_FAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTO2\CPMS_LEVEL	23.73	18.2	29.93	22.3	28.32	29.58	12.43	17.96	15.98	34.53	35.22	27.13	43.48	47.24
FTO2\TE101	85	85	83	81	82	81	76	74	72	80	110	107	109	110
FTO2\TE105	193	186	167	197	174	211	155	172	161	225	169	186	190	196
FTO2\TE106	101	214	199	96	113	294	151	93	129	319	159	118	140	179
FTO2\TE107	230	110	109	239	181	94	126	194	144	92	153	213	206	169
FTO2\TE108	1628	1604	1610	1632	1621	1597	1619	1626	1614	1591	1618	1628	1622	1612
FTO2\TE109	1610	1627	1622	1610	1617	1631	1618	1616	1621	1629	1614	1616	1619	1623
TDU2\CYL_DRIVE_AMPS	12	12	11	11	12	12	12	13	14	14	13	12	13	14
TDU2\CYL_DRIVE_RPM	3.21	3.21	3.14	3.15	3.14	3.12	3.11	3.23	3.21	3.21	3.14	3.13	3.14	3.14
TDU2\CYL_FEED_SPEED_SET	53	53	63	63	63	63	63	63	63	63	63	53	63	63
TDU2\FEEDSCREW_RUNTIME	567	573	579	585	591	597	603	609	615	621	627	633	639	645
TDU2\OXYGEN_DISCHARGE	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TDU2\PURGE_DAMPER	25	25	25	25	25	25	25	25	25	25	25	25	25	25
TDU2\PV_PIC	-0.13	-0.21	-0.19	0	-0.2	-0.27	0.09	-0.06	0.01	-0.26	-0.1	-0.14	-0.21	-0.2
TDU2\TE_10_TEMP	1541	1538	1535	1533	1532	1535	1545	1550	1551	1553	1557	1576	1598	1598
TDU2\TE_11_TEMP	1516	1513	1510	1508	1506	1507	1516	1520	1524	1540	1556	1574	1593	1603
TDU2\TE_12_TEMP	1421	1416	1412	1409	1407	1419	1426	1425	1458	1488	1509	1535	1551	1558
TDU2\TE_13_TEMP	1244	1239	1234	1230	1227	1230	1235	1233	1252	1284	1308	1330	1353	1368
TDU2\TE_14_TEMP	952	942	942	943	936	960	946	899	890	907	927	946	947	949
TDU2\TE_15_TEMP	221	218	221	220	221	219	223	216	219	212	214	212	216	219
TDU2\TE_16_TEMP	1544	1535	1558	1558	1562	1547	1551	1559	1599	1626	1564	1295	1593	1612
TDU2\TE_17_TEMP	1711	1710	1711	1708	1713	1716	1573	1686	1693	1697	1706	1708	1702	1700
TDU2\TE_18_TEMP	1507	1510	1508	1506	1504	1535	1510	1528	1580	1586	1596	1616	1610	1611
TDU2\TE_1_TEMP	1062	1062	1066	1069	1070	1069	1058	1062	1073	1116	1131	1081	1061	1083
TDU2\TE_2_TEMP	1388	1384	1388	1390	1390	1386	1388	1389	1402	1439	1434	1401	1395	1419
TDU2\TE_3_TEMP	1640	1639	1645	1647	1650	1648	1633	1637	1640	1654	1658	1599	1592	1622
TDU2\TE_4_TEMP	1727	1724	1729	1729	1732	1730	1734	1727	1720	1727	1729	1665	1660	1691
TDU2\TE_5_TEMP	1596	1595	1597	1598	1600	1602	1599	1589	1580	1579	1582	1566	1562	1569
TDU2\TE_6_TEMP	1582	1584	1586	1587	1588	1592	1586	1570	1562	1561	1565	1568	1564	1564
TDU2\TE_7_TEMP	1579	1584	1588	1590	1591	1597	1574	1555	1560	1570	1578	1582	1584	1585
TDU2\TE_8_TEMP	1565	1569	1571	1573	1574	1583	1558	1547	1553	1562	1572	1586	1585	1582
TDU2\TE_9_TEMP	1537	1534	1532	1531	1531	1538	1546	1544	1539	1534	1538	1560	1572	1567
TDU2\TOTAL_TONS	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TDU2\ZONE1_TEMP_SET	1387	1387	1387	1387	1387	1387	1387	1387	1487	1437	1437	1402	1412	1412
TDU2\ZONE2_TEMP_SET	1598	1598	1598	1598	1598	1588	1588	1608	1613	1613	1613	1613	1613	1613
TDU2\ZONE3_TEMP_SET	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
VRS2\CT_LIQUIDOUTLETTEMP	97	98	98	97	97	96	97	98	99	100	101	101	101	101
VRS2\HC_GASDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\HC_INLETGASPRES	-3	-4	-3	-3	-3	-3	-4	-4	-4	-5	-4	-4	-4	-4
VRS2\HC_INLETGASTEMP	890	884	879	877	870	882	876	832	820	833	842	850	849	853
VRS2\HE_COOLSIDEDIFFPRES	15	15	15	15	15	15	15	15	15	15	15	15	15	15
VRS2\HE_SCRUBSIDEDIFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\ID_DAMPERPOSITION	100	100	100	100	100	100	100	100	100	100	100	100	100	100
VRS2\ID_FANSPEED	49	45	45	45	45	45	45	45	45	69	69	18	65	65
VRS2\ID_OUTLETPRES	1	0	1	0	1	0	0	0	0	4	4	-1	3	3
VRS2\RD_CHEVRONDIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\RD_INLETGASTEMP	914	908	905	901	899	909	901	877	868	872	882	890	890	895
VRS2\RD_OXYGEN	16	22	21	21	6	6	7	8	8	9	8	9	9	9
VRS2\RD_SCRUBBERDIFFPRES	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VRS2\RD_SCRUBLIQUIDTEMP	130	131	130	129	129	127	129	132	133	134	136	136	136	137
VRS2\WESP_CURRENT_AMP	0	0	0	0	2	2	1	3	1	2	6	4	3	3
VRS2\WESP_DIFFPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_OUTLETGASFLOW	7501	7959	7959	7959	7959	7959	7959	7959	7959	4803	6310	7959	7959	6062
VRS2\WESP_OUTLETGASPRES	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
VRS2\WESP_OUTLETGASTEMP	127	127	126	124	123	121	118	117	119	126	154	157	157	161
VRS2\WESP_OXYGEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VRS2\WESP_VOLTAGE_VOLT	0	0	0	0	16	15	17	15	17	16	9	12	11	11

ORIGINAL (Red)

ORIGINAL (Red)

POP Re-test Sample #1
13-Apr-99

Test	Soil Moisture	Net weight	Start time	End Time	Total Time	Feed Rate	Production (TPH)
Rampup	11.6	5520	850	905	15	32	12.19
	10.5	4640	905	915	10	32	
		4960	915	927	13	32	12.72
		5640	927	939	12	35	
		5260	939	952	13	35	12.42
		5920	952	1006	14	35	
		6040	1006	1019	13	37	12.93
		5600	1019	1033	14	37	
		5760	1033	1045	12	37	13.68
		5180	1045	1057	12	37	
		4980	1057	1108	11	37	13.58
		4860	1108			FTO fault	
		5680	1319	1331	12	39	14.10
		5600	1331	1343	12	39	
		5440	1343	1356	13	39	12.86
		5280	1356	1408	12	39	
		5780	1408	1419	11	40	14.97
		5200	1419	1430	11	40	
POP Test		5700	1430	1442	12	40	14.68
		6040	1442	1454	12	40	
		5940	1454	1507	13	40	14.71
		5340	1507	1517	10	40	
		5260	1517	1529	12	40	12.94
		5520	1529	1542	13	40	
		5680	1542	1554	12	40	15.94
		5480	1554	1603	9	40	
		6260	1603	1616	13	40	12.53
		5020	1616	1630	14	40	
		5700	1630	1641	11	40	15.14
		5400	1641	1652	11	40	
		6100	1652	1705	13	40	13.97
		5540	1705	1717	12	40	
		5520	1717	1729	12	40	13.90
		5140	1729	1740	11	40	
		6260	1740	1753	13	40	14.19
		6040	1753	1806	13	40	
		6440	1806	1819	13	40	14.54
		6160	1819	1832	13	40	
		6100	1832	1845	13	40	14.38
		6360	1845	1858	13	40	
Ave. Moisture	**11.05**					**Daily Avg.**	**13.82**
						POP Test Avg.	14.35

The POP Test average for the three tests are 13.84 tons per hour.
The average moisture for the three tests are 12.33%.

ORIGINAL (Red)

POP Re-test Sample #2
14-Apr-99

Test	Soil Moisture	Net weight	Start time	End Time	Total Time	Feed Rate	Production (TPH)
Rampup	12	5360	1441	1453	12		
	10	5720	1453	1505	12		14.06
	14	6000	1505	1518	13		
	13	5660	1518	1533	15		12.58
		5660	1533	1545	12	50	
		5760	1545	1559	14	50	12.97
		5480	1559	1611	12	50	
		5540	1611	1622	11	55	15.47
		6320	1622	1634	12	55	
		5460	1634	1645	11	55	15.85
		6160	1645	1656	11	55	
POP Test		5960	1656	1708	12	55	14.85
		5920	1708	1720	12	55	
		5880	1720	1735	15	55	13.52
		5840	1735	1746	11	55	
		5000	1746	1757	11	50	12.50
		4580	1757	1809	12	45	
		5860	1809	1823	14	45	12.71
		6000	1823	1837	14	48	
		5760	1837	1851	14	48	12.75
		6140	1851	1905	14	48	
		6060	1905	1918	13	53	14.15
		6200	1918	1931	13	53	
		5720	1931	1943	12	53	13.82
		5800	1943	1956	13	53	
		6040	1956	2009	13	53	
		5860	2009	2022	13	56	13.85
		6140	2022	2035	13	56	
		6180	2035	2048	13	56	14.08
		6020	2048	2101	13	56	
Ave. Moisture	**12.25**					**Daily Avg.**	**13.80**
						POP Test Avg.	**13.58**

ORIGINAL (Red)

POP Re-test Sample #3
15-Apr-99

Test	Soil Moisture	Net weight	Start time	End Time	Total Time	Feed Rate	Production (TPH)
Rampup	14	5000	722	732	10	48	13.83
	13.04	4220	732	742	10	48	
POP Test	14	4260	742	752	10	48	12.20
		4280	752	803	11	48	
		4300	803	814	11	48	12.07
		6160	830	845	15	48	
		5920	855	908	13	48	12.44
		6520	908	925	17	48	
		6420	925	942	17	48	
		6080	942	959	17	changed feed	
		5220	959	1012	13	53	
		5520	1012	1024	12	53	12.81
		4300	1024	1035	11	53	
		4580	1035	1049	14	changed feed	
		5920	1049	?	10	63	16.32
		4960	?	1109	10	63	
		4760	1109	1120	11	63	
		5980	1120	?	9	63	16.01
		4160	?	1139	10	63	
		5440					
Ave Moisture	**13.68**					**Daily Avg.**	**13.67**
						POP Test Avg.	**13.64**

5/10/99

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Potentially Applicable State of Maryland and Federal Air Regulatory Standards and Test Methods

Southern Maryland Wood Treating (SMWT) Site

This appendix presents applicable air regulatory requirements and compliance test methods for the SMWT site. The regulatory requirements presented here are primarily based on the record of decision (ROD) for the SMWT site prepared by the USEPA dated 09/08/95 and subsequent guidance provided by both the EPA and the MDE. The proposed compliance test methods (where applicable) are based on the general guidance on acceptable testing and monitoring methods provided in COMAR 26.11.01.04 as well as specific guidance provided in the applicable state and federal regulations. The stack test methods presented in this document were approved by the MDE as the appropriate compliance demonstration methods.

Applicable air regulatory requirements and compliance test methods are presented below for each of the pollutant or an environmental parameter identified in the ROD.

Visible Emissions

- **Regulated Under :**

  COMAR 26.11.06.02 - General Emission Standards : Visible Emissions

- **Applicable Standard :**

  COMAR 26.11.06.02(C) - Stack emissions shall not exceed 20% opacity (general emission standard for St. Mary's County- Maryland Region V)

  (This standard applies to the oxidizer stacks at the batch and continuous treatment systems)

- **Compliance Stack Test Method :**

  40 CFR 60, Appendix A, USEPA Test Method 9

Particulate Matter

- **Regulated Under :**

  COMAR 26.11.06.03 - General Emission Standards : Particulate Matter

- **Applicable Standards/Requirements :**

1. COMAR 26.11.06.03(B) - Stack emissions shall not exceed 0.05 gr/SCFD of particulate matter (general emissions standard for confined source installations constructed after 1972).

   (This standard applies to the oxidizer stacks at the batch and continuous treatment systems)

2. COMAR 26.11.06.03(D) - Reasonable precautions, such as application of water on dirt roads, stockpiles, etc., should be taken to prevent particulate matter from becoming airborne.

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- **Compliance Stack Test Method** :

  40 CFR 60, Appendix A, USEPA Test Method 5

Volatile Organic Compounds (includes non-methane organic compounds)

- **Regulated Under :**

  COMAR 26.11.06.06 - General Emission Standards : Volatile Organic Compounds

  40 CFR 264, Subpart BB - Air Emission Standards for Equipment Leaks

  40 CFR 264, Subpart AA - Closed Vent Systems and Control Devices

- **Applicable Standards /Requirements:**

1. None under COMAR 26.11.06.06[1].

   Rationale for non-applicability of Standards under COMAR 26.11.06.06

   COMAR 26.11.06.06(B) - Standard does not regulate installations in St. Mary's County.
   COMAR 26.11.06(C) - SMWT site will not have the regulated source category (i.e., VOC-Water separators).
   COMAR 26.11.06(D) - Standard regulates sources that disposes of or treats wastes containing VOC in the outside atmosphere in a manner that may cause evaporation of greater than 20 pounds per day. While the SMWT will treat soils containing VOCs, the treatment operations will be conducted in *confined units* and not in the *outside atmosphere.*

2. a) 40 CFR 264, Subpart BB

   In accordance with Section 264.1050 (Applicability), these standards apply to hazardous waste streams whose total organic concentration exceeds 10% by weight. Since the only process streams expected to exceed 10% are in the gas phase, and since a gas phase is not considered a hazardous waste (by definition of hazardous waste), then the Subpart BB Standards have no impact on the TDU operations.

3. a) 40 CFR 264, Subpart AA , Sec. 264.1032 (Standards: Process Vents)

   - Combined vent emissions from affected process vents at the facility will be kept below 3.1 tons/yr, or

   - Process vent emissions control device efficiency shall be 95% (facility-wide basis).

   b) 40 CFR 264, Subpart AA, Sec. 264.1033 (Standards: Closed vent system and control devices)

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[1] Note : Overall design VOC control device efficiency (> 95%) at SMWT site is higher than the most stringent control device efficiency requirement (85%) for other applicable sources under COMAR 26.11.06.06.

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- Overall VOC emissions control efficiency of 95% or more is required
- In accordance with Section 264.1033(i), the contractor is required to describe the emission control device operation and identify the process parameters that indicates proper operation and maintenance of the control device.

(These standards/requirements apply to the emission control systems for the batch and continuous units. The descriptions required by the Subpart AA regulations are contained in this Proof of Performance Plan.)

- **Compliance Stack Test Methods** :

  Standard: COMAR 26.11.06.06
  Test Method: Not applicable

  Standard: 40 CFR 264, Subpart BB:
  Test Method: 40 CFR 60, Appendix A, USEPA Test Method 21

  Standard: 40 CFR 264, Subpart AA:
  Test Method: SW846, Method 0030

Toxic Air Pollutants

- **Regulated Under :**

  COMAR 26.11.15

- **Applicable Standards/Requirements :**

1. COMAR 26.11.15.04 - Emissions of each of the TAPs shall be quantified.
2. COMAR 26.11.15.05 - T-BACT should be installed on sources emitting Class-I TAPs[2].
3. COMAR 26.11.15.06 - Demonstration to the MDE that the total allowable emissions will not unreasonably endanger human health is required.
4. COMAR 26.11.15.07 - Screening analysis or second tier analysis[3] may be used to demonstrate compliance with COMAR 26.11.15.06. For Class I TAPs, to assess carcinogenic effects, screening analysis needs to show that total allowable emissions from the premises will not cause increases in ambient levels that exceed risk-based screening levels for the TAP. For Class I or Class II TAPs, to assess potential toxic effects other than cancer by a screening analysis showing that total allowable

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[2] According to ETG, the combination of control technologies proposed at SMWT will result in the maximum degree of overall emission reduction that is technologically and economically feasible and is, therefore, the Best Available Control Technology.

[3] The Maryland Department of the Environment (MDE) Air and Radiation Management Administration has established TAPs screening levels which provide off-site risk-based concentrations for each TAP. Through the air dispersion modeling, allowable concentrations of each TAP emitted at the stack are established so that off-site concentrations do not exceed the risk-based TAPS screening level. The actual stack concentrations measured during the POP test are then compared to the allowable stack emissions to be sure there are no exceedences.

A Table of the Maryland TAPs screening levels and further details of the air dispersion modeling used to establish the allowable stack emissions, are presented in Appendix D.

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emissions from the premises will not cause increase in ambient levels that exceed applicable TLV based, threshold based, or special screening levels.

(These standards/requirements apply to oxidizer stacks from continuous and batch operations)

- **Compliance Stack Test Methods :**

  For VOC TAPs:
  SW846 Method 0030

  For SVOC TAPs:
  SW846 Method 00~~23~~ 10

  For dioxins and furans:
  40 CFR 60, Appendix A, USEPA Test Method 23.

Nuisance

- **Regulated Under :**

  COMAR 26.11.06.08

- **Applicable Standard/Requirement :**

  Facility operations should not create nuisance or air pollution

- **Compliance Stack Test Method :**

  Not applicable

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CALCULATION OF STACK MASS EMISSION RATE LIMITS

INTRODUCTION

As part of the SMWT site remediation, thermal desorption was used to remove contamination from the soil. The contaminated air stream generated by the thermal desorption process was then treated by the vapor recovery systems of each TDU to remove contaminants from the air before it was vented to the atmosphere through the two stacks. To demonstrate that air emissions were in compliance with the State of Maryland regulations discussed in Appendix E for toxic air pollutants (TAPs), stack sampling was conducted during the POP test.

The Maryland Department of the Environment Air and Radiation Management Administration (ARMA) has established TAPs screening levels which provide an off-site risk-based concentration for each TAP. Through air dispersion modeling, allowable concentrations of each TAP emitted at the stack were established to ensure that off-site concentrations did not exceed the risk-based TAPs screening levels. The actual stack concentrations and emission rates measured during the POP test were compared to the allowable stack emission limits to ensure the limits were not exceeded.

SCREENING MODELING

In any modeling study, the initial approach is to perform screening modeling first. Screening models (e.g., SCREEN3) are simple and easy to use, and they give very conservative results. If the results of a screening modeling study are acceptable, one can be confident that actual ambient air concentrations will be acceptable. In this study, SCREEN3 was used to estimate the maximum allowable limits for stack emissions.

CALCULATION OF STACK EMISSION LIMITS

The following is a step by step evaluation of how stack emission limits were calculated. The stack emission limits presented in Table F-1 were based on values, for such input parameters as temperature and velocity, that were measured during the POP tests. The stack limits were estimated for a facility operating scenario in which both of the CTDUs would be operated under the re-test conditions and the BTDUs would not be operated at all.

STEP 1: Determine the contaminants of concern

A list of TAPs was developed based on actual contaminants present in the soil at the site and is found in Table F-1.

STEP 2: Determine off-site screening levels for all TAPs

Off-site screening levels, as developed by MDE ARMA, are presented in Table F-1.

STEP 3: Determine a maximum dilution factor using SCREEN3 modeling:

A. Assumptions for Model:

1. Assume unit (1 g/s) emission rate from each stack- results can then be read directly as dilution factor.
2. Assume rural terrain- SMWT site is located in a country (rural) location.
3. Assume the location of maximum ambient air concentration is the same for all stacks. Adding all maxima is the most conservative way to combine results. (This was done because all stacks will be operating at the same time during full-scale operations.)
4. Assume no chemical reactions occur as chemicals disperse in atmosphere.
5. Assume dispersion characteristics are the same for all chemicals.

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B. Inputs for SCREEN3 Modeling Parameters:

1. Source Type: point (discharge stack represented as a point source)
2. Emission Rate: 1 g/s (assumed unit emission rate)
3. Stack Height: 7.9248 m (measured from as-built conditions)
4. Continuous Stack Inside Diameter: 0.2540m (measured from as-built conditions)
5. Continuous Stack Exit Velocity: 344 ACFM
6. Continuous Stack Gas Exit Temperature: 416 K (variable)
7. Ambient Air Temperature: 293K
8. Receptor Height: 0 m (ground level)
9. Urban/Rural Option: Rural Setting
10. No building downwash

C. Run SCREEN3 Model:

The SCREEN3 Model (version dated 96043) was used to determine a maximum dilution factor for each stack for 1 hour, 8 hour, and annual screening levels. The SCREEN3 results were multiplied by 0.7 to convert them from a 1-hour average into an 8-hour average, corresponding to the averaging time used for the concentration limit. A factor of 0.08 was used to convert to an annual average. The dilution factor for each of the TDUs was estimated from the SCREEN3 model using the coolest stack gas temperature and lowest flow rate measured during the POP test. This gives the most conservative dilution factor.

D. Calculate Maximum Emission Rate allowed for each Contaminant listed in Table F-1 for each Source (i.e., Batch Stack, Continuous Stack 1, and Continuous Stack 2).

Following is an explanation of how the maximum allowable individual stack emission rates for each contaminant were calculated from dispersion modeling results and TAPs screening levels. The calculated results for the maximum allowable individual stack emission rates for each contaminant are shown in Table F-1.

The equation used was:

$$MER\frac{g}{s} = \frac{SL\frac{\mu g}{m^3}}{DL\frac{\mu g}{m^3}\Big/\frac{g}{s}}$$

where MER is the constituent-specific mass emission rate, SL is the TAP constituent-specific screening level, and DL is the modeled dilution factor.

Concentration in the above equation is the off-site concentration limit, listed in Table F-1, adjusted to account for the fraction attributed to the individual stack. The off-site limit concentration represents the maximum air concentration allowed from emissions from all of the sources (stacks). To estimate the maximum emission rate allowed from each individual stack, the portion of the overall ambient air concentration attributed to each stack was based on its pro-rated share of the total volumetric flow rate emitted by all the stacks. This was reasonable as contaminant concentrations in the effluent were similar for each of the stacks.

The fraction of the off-site limit that is allowed to come from each stack can be estimated by calculating the fraction of the total flow (all TDUs) that comes from each stack. That is, using the first scenario as an example:

Stack's fraction of concentration = Stack's fraction of flow x off-site limit

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Note: The total maximum emission limit for each chemical was determined by adding the individual emission limits for the each of the stacks. Only one continuous unit was tested in April 1999. Since two continuous units will operate during full-scale production, each POP sample result must be combined and then compared to the sum of the individual emission limits. This was done, and the results are reported in Table 3-8. These results indicate that the total facility emissions were within the limits set by the TAPs screening levels. That is, all stacks emitting at their maximum rates simultaneously do not cause a violation of the standards. If an individual emission limit for a chemical were exceeded from a particular stack, the result is still acceptable as long as the total emission limit for the facility is not exceeded. This is acceptable because the off-site limit will not be exceeded as long as the total emission limit is not exceeded.

*The dilution factor is the concentration output from SCREEN3 when a unit emission rate is used for input. That is, 1 g/s is used as the input emission rate. The ambient air concentration that the model gives can then be thought of as a concentration per unit of emission, or dilution factor. Modelers often use a unit emission rate then scale the resulting dilution factor by the actual emission rate. That way, the model does not need to be re-run for each new emission rate, providing the other input parameters remain unchanged. This works because the output air concentration is directly proportional to the input emission rate.

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ORIGINAL (Red)

Table F-1. Summary of Off-Site Ambient Air Concentration Thresholds and Emission Limits (TDUs only)
Both CTDUs at POP #2 conditions.

	Off-Site Limits			Maximum Allowable Emission Rates		
Contaminant	1-Hour Screening Level (TLV-STEL[3] or TLV-C[4] /100)	8-Hour Screening Level [2] (TLV-TWA/100)	Annual Screening Level [1] (70 year exposure)	1-Hour Screening Level (TLV-STEL[3] or TLV-C[4] /100)	8-Hour Screening Level [2] (TLV-TWA/100)	Annual Screening Level [1] (70 year exposure)
				Continuous	Continuous	Continuous
	(mg/m^3)	(mg/m^3)	(mg/m^3)	(g/s)	(g/s)	(g/s)
Polynuclear Aromatic Hydrocarbons (PAHs)						
Acenaphthene		2			1.15E-03	
Acenapthylene		24.6			1.41E-02	
Anthracene		2			1.15E-03	
Benzo(a)anthracene			0.0575			2.89E-04
Benzo(a)pyrene			0.00478			2.41E-05
		2			1.15E-03	
Benzo(b)fluoranthene			0.0575			2.89E-04
	206.4			8.31E-02		
Benzo(k)fluoranthene			0.0575			2.89E-04
Chrysene		2			1.15E-03	
Dibenzo(a,h)anthracene			0.0575			2.89E-04
Fluoranthene		82			4.72E-02	
Fluorene		2			1.15E-03	
Indeno(1,2,3-cd)pyrene			0.0575			2.89E-04
Naphthalene		520			2.99E-01	
	790			3.18E-01		
Phenanthrene		9.8			5.64E-03	
Pyrene		2			1.15E-03	
Semi-volatile Organic Compounds (SVOCs)						
Carbazole		5.6			3.22E-03	
→ Dibenzofuran						
Bis (2-Ethylhexyl)phthalate		202			1.16E-01	
Methylnaphthalene		~~X~~ 67				
enol		190			1.09E-01	
2,4-Dimethylphenol		131.2			7.55E-02	
2-Methylphenol		220			1.27E-01	
4-Methylphenol		220			1.27E-01	
Pentachlorophenol		5			2.88E-03	
1,2-Dichlorobenzene		1500			8.63E-01	
	3010			1.21E+00		
+ 4-Bromophenyl phenyl ether						
Nitrobenzene		50			2.88E-02	
Di-n-butyl phthalate		~~X~~ 50				
Diethyl phthalate		~~X~~ 50				
+ Dimethyl phthalate						

detected

not detected

- detected

ORIGINAL (Red)

Table F-1. Summary of Off-Site Ambient Air Concentration Thresholds and Emission Limits (TDUs only)
Both CTDUs at POP #2 conditions.

Contaminant	Off-Site Limits: 1-Hour Screening Level (TLV-STEL[3] or TLV-C[4]/100)	Off-Site Limits: 8-Hour Screening Level[2] (TLV-TWA/100)	Off-Site Limits: Annual Screening Level[1] (70 year exposure)	Maximum Allowable Emission Rates: 1-Hour Screening Level (TLV-STEL[3] or TLV-C[4]/100)	Maximum Allowable Emission Rates: 8-Hour Screening Level[2] (TLV-TWA/100)	Maximum Allowable Emission Rates: Annual Screening Level[1] (70 year exposure)
				Continuous	Continuous	Continuous
	(mg/m^3)	(mg/m^3)	(mg/m^3)	(g/s)	(g/s)	(g/s)
Volatile Organic Compounds (VOCs)						
Benzene			1.21			6.09E-03
		16			9.20E-03	
	80			3.22E-02		
Chlorobenzene		460			2.65E-01	
1,1-Dichloroethene		200			1.15E-01	
	790			3.18E-01		
Tetrachloroethene		1700			9.78E-01	
	6850			2.76E+00		
Ethylbenzene		4340			2.50E+00	
	5430			2.19E+00		
Styrene		850			4.89E-01	
	1700			6.84E-01		
Toluene		1880			1.08E+00	
m/p-Xylene		4340			2.50E+00	
	6510			2.62E+00		
o-Xylene		4340			2.50E+00	
	6510			2.62E+00		
Vinyl chloride			0.117			5.89E-04
		130			7.48E-02	
1,1,1-Trichloroethane		19100			1.10E+01	
	24600			9.90E+00		
1,4-Dichlorobenzene			1.46			7.35E-03
		600			3.45E-01	
Bromomethane		39			2.24E-02	
Carbon disulfide		310			1.78E-01	
Chloroethane		2.6			1.50E-03	
	13			5.23E-03		
Chloromethane		105			6.04E-02	
	525			2.11E-01		
+ Methyl Ethyl Ketone						
Carbon Tetrachloride		0.31			1.78E-04	
Chloroform		0.49			2.82E-04	
1,2-Dichloroethane		0.4			2.30E-04	
→ Trichloroethene						
Methylene Chloride		1.74			1.00E-03	
Other Detected Chemicals						
Dioxins and Furans			3.E-07			1.51E-09
		0.0002			1.15E-07	

1. Sources of data: NIOSH Handbook, Class I Toxic Air Pollutants Tables, Hazardous Substances Database (TOXNET), and MSDS.

1. State Screening Level for Carcinogens = risk-based annual average chemical concentration that would increase a persons lifetime cancer risk by 1 in 100,000 if exposed continuously for 70 years.
* Skin absorption designation
** NIOSH exposure standard for the cyclohexane extractable fraction
*** Limit as Benzene soluble fraction
xx/xx indicate Class I table values/ MSDS TWA exposure data

2. TLV-TWA = threshold limit value-time weighted average means a concentration recommended by ACGIH for a normal 8-hour workday and 40-hour work week, or based on animal toxicity data for compounds without an ACGIH recommended value.
3. TLV-STEL - short term exposure limit-TLV means a 15-minute time-weighted average conc that ACGIH indicates should not be exceeded during the workday.
4. TLV-C means a concentration that ACGIH indicates should not be exceeded even instantaneously in a workplace.

→ no screening level but detected so get a screening level
* 1 not available but not included
+ no screening level & not detected so delete from table

ORIGINAL (Red)

Appendix G

CALCULATION OF STACK MASS EMISSION RATES

INTRODUCTION

One of the goals of the POP test was to determine the mass emission rate of the various constituents of concern from the continuous TDU under operational conditions. These compound-specific mass emission rates were then compared with the corresponding stack emission limits. (The stack emission ~~limits,~~ calculated in Appendix F, were based on ~~screening~~ dispersion modeling and risk-based ambient air concentration thresholds.)

Samples were collected according to the sampling protocol, which lists the various constituents of interest, the appropriate EPA sampling ~~methods,~~ and the appropriate EPA anal~~ytical method~~.

Following is a step-by-step explanation of the calculation used to determine the mass emission rate for each constituent.

STEP 1: Determine sample ~~mass~~

Samples were analyzed by various laboratories using the appropriate EPA method. The results, reported as mass of constituent in the sample, are summarized in tables at the end of this appendix. VOC sample masses are summarized in the G-1 series of tables.

STEP 2: Determine sample volume

Sample volumes were determined by the stack-testing contractor, using standard techniques, and are reported in Table G-~~2~~ 3

STEP 3: Determine stack gas concentration

The concentration of the constituents in the stack gas for a particular Test were readily found by simply dividing the total (constit~~uent-specific)~~ sample mass by the corresponding ~~total~~ sample volume of stack gas.

STEP 4 Determine stack volumetric flow rate

Stack volumetric flow rates were determined by the stack-testing contractor, using standard techniques, and are reported in Table G-3.

STEP 5 Determine the stack mass emission rate

The stack mass emission rate is easily determined by multiplying the stack gas concentration by the stack gas volumetric flow rate. (All volumes are at dry standard conditions.) Results of the emission rate calculation for VOCs can be ~~found in~~ Table G-4, SVOCs can be found in Table G-5, and Dioxins can be found in Table G-6.

ORIGINAL (Red)

Appendix G

Table Number	Table Description
Table G-1-A	VOC Sample Mass Re-test 1 Inlet
Table G-1-B	VOC Sample Mass Re-test 1 Outlet
Table G-1-C	VOC Sample Mass Re-test 2 Inlet
Table G-1-D	VOC Sample Mass Re-test 2 Outlet
Table G-1-E	VOC Sample Mass Re-test 3 Inlet
Table G-1-F	VOC Sample Mass Re-test 3 Outlet
Table G-3	Stack Sampling Parameters
Table G-4-A	VOC Mass Emission Rate Re-test 1 Summary
Table G-4-B	VOC Mass Emission Rate Re-test 2 Summary
Table G-4-C	VOC Mass Emission Rate Re-test 3 Summary
Table G-5	SVOC Mass Emission Rate Summary
Table G-6	Dioxin Mass Emission Rate Summary

Table G-1-A

VOC Run 1 Inlet

ORIGINAL (Red)

RUN #1 INLET	VOST Tube #1 R1-I2-T/TC 1L VOST Subtotal ng	VOST Tube #2 R1-I3-T/TC 1L VOST Subtotal ng	VOST Tube #3 R1-I4-T/TC 0.5L VOST Subtotal ng	Sample Total ng
Dichlorodifluoromethane	1700 J	< 2000 UJ	< 2000 UJ	5700
Chloromethane	319380 J	58160 J	60560 J	438100
Vinyl chloride	1230 J	< 2000 UJ	< 2000 UJ	5230
1,3-Butadiene	669580 J E	3280930 E J	3262370 J	7212880
Bromomethane	< 2000 U	< 2000 U	< 2000 U	6000
Chloroethane	2670	< 2000 U	< 2000 U	6670
Trichlorofluoromethane	< 2000 U	< 2000 U	< 2000 U	6000
1,1-Dichloroethene	1560	< 2000 U	< 2000 U	5560
Carbon disulfide	6800	7690	16050	30540
Methylene chloride	17590	12400	24000	53990
Acrylonitrile	11800	9600	7660	29060
trans-1,2-Dichloroethene	1180	< 2000 U	< 2000 U	5180
1,1-Dichloroethane	< 2000 U	780	< 2000 U	4780
2,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
cis-1,2-Dichloroethene	< 2000 U	< 2000 U	< 2000 U	6000
Chloroform	2910	5640	3650	12200
Bromochloromethane	< 2000 U	< 2000 U	< 2000 U	6000
1,1,1-Trichloroethane	< 2000 U	< 2000 U	< 2000 U	6000
1,1-Dichloropropene	510	710	< 2000 U	3220
Carbon tetrachloride	< 2000 U	< 2000 U	< 2000 U	6000
Benzene	39590	791820 J E	502210 J E	1333620
1,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
Trichloroethene	1680	1740	2070	5490
1,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
Dibromomethane	< 2000 U	< 2000 U	< 2000 U	6000
cis-1,3-Dichloropropene	< 2000 U	< 2000 U	< 2000 U	6000
Toluene	13450	373400	228430	615280
trans-1,3-Dichloropropene	< 2000 U	< 2000 U	< 2000 U	6000
1,1,2-Trichloroethane	< 2000 U	18280	11750	32030
1,3-Dichloropropane	410	< 2000 U	< 2000 U	4410
Tetrachloroethylene	< 2000 U	< 2000 U	< 2000 U	6000
Dibromochloromethane	< 2000 U	< 2000 U	< 2000 U	6000
1,2-Dibromoethane	640	< 2000 U	< 2000 U	4640
Chlorobenzene	< 2060 R	1810 R	1700 R	5570
1,1,1,2-Tetrachloroethane	< 2000 U	< 2000 U	< 2000 U	6000
Ethylbenzene	2220 R	47450 R	26350 R	76020
m/p-Xylene	4680 R	121800 R	69680 R	196160
o-Xylene	1690 R	43960 R	24360 R	70010
Styrene	16740 R	143950 R	77390 R	238080
Bromoform	< 2000 R	< 2000 R	< 2000 R	6000
Isopropyl benzene	1140 R	5080 R	2960 R	9180
1,1,2,2-Tetrachloroethane	450 R	< 2000 R	< 2000 R	4450
1,2,3-Trichloropropane	< 2000 R	< 2000 R	< 2000 R	6000
Bromobenzene	1420 R	< 2000 R	660 R	4080
2-Chlorotoluene	980 R	9560 R	5650 R	16190
n-Propylbenzene	1270 R	33780 R	17800 R	52850
1,3,5-Trimethylbenzene	1370 R	34470 R	17610 R	53450
4-Chlorotoluene	620 R	2610 R	910 R	4140
tert-Butylbenzene	800 R	1050 R	< 2000 R	3850
1,2,4-Trimethylbenzene	2570 R	28270 R	15340 R	46180
sec-Butylbenzene	740 R	1340 R	1160 R	3240
p-Isopropyltoluene	2010 R	10570 R	6270 R	18850
1,3-Dichlorobenzene	850 R	890 R	950 R	2690
1,4-Dichlorobenzene	800 R	750 R	880 R	2430
n-Butylbenzene	1470 R	6480 R	3680 R	11630
1,2-Dichlorobenzene	960 R	690 R	840 R	2490
1,2-Dibromo-3-chloropropane	< 2000 R	< 2000 R	< 2000 R	6000
1,2,4-Trichlorobenzene	1000 R	< 2000 R	< 2000 R	5000
Hexachlorobutadiene	< 2000 R	< 2000 R	< 2000 R	6000
Naphthalene	50450 R E	65480 R E	59480 R	175410
1,2,3-Trichlorobenzene	< 1340 R	< 2000 R	< 620 R	3960

ORIGINAL (Red)

Table G-1B
VOC Run 1 Outlet

	VOST Tube #1	VOST Tube #2	VOST Tube #3	
	R1-O1-T/TC 20L	R1-O3-T/TC 10L	R1-O4-T/TC 5L	
RUN #1 OUTLET	VOST Subtotal	VOST Subtotal	VOST Subtotal	Sample Total
	ng	ng	ng	ng
1,1,1,2-Tetrachloroethane	< 2000 U	< 200 U	< 200 U	2400
1,1,1-Trichloroethane	< 2000 U	2036	1497 J	5533
1,1,2,2-Tetrachloroethane	< 2000 R	< 200 R	< 200 R	2400
1,1,2-Trichloroethane	12750	< 2529 U	< 1308 U	16587
1,1-Dichloroethane	< 2000 U	49554	8651	60205
1,1-Dichloroethene	< 2000 U	34712	6606	43318
1,1-Dichloropropene	< 2000 U	< 200	< 200 U	2400
1,2,3-Trichlorobenzene	< 2000 R	< 200 R	< 200 R	2400
1,2,3-Trichloropropane	< 2000 R	< 200 R	< 200 R	2400
1,2,4-Trichlorobenzene	1120 R J	< 200 R	< 200 R	1520
1,2,4-Trimethylbenzene	10610 R	8907 R	2895 R	22412
1,2-Dibromo-3-chloropropane	< 2000 R	< 200 R	< 200 R	2400
1,2-Dibromoethane	620 J	< 200 U	< 200 U	1020
1,2-Dichlorobenzene	680 R J	< 200 R	< 200 R	1080
1,2-Dichloropropane	< 2000 U	< 200 U	< 200 U	2400
1,2-Dichloropropane	< 2000 U	< 200 U	< 200 U	2400
1,3,5-Trimethylbenzene	9280 R	8563 R	2972 R	20815
1,3-Butadiene	< 294660 UJ	226210 J	88849 J	609719
1,3-Dichlorobenzene	760 R J	< 200 R	< 200 R	1160
1,3-Dichloropropane	< 390 U J	< 200 U	< 200 U	790
1,4-Dichlorobenzene	8220 R	< 200 R	< 200 R	8620
2,2-Dichloropropane	< 2000 U	< 200 U	< 200 U	2400
2-Chlorotoluene	3370 R	1487 R J	413 R J	5270
4-Chlorotoluene	640 R J	< 1007 R	< 200 R	1847
Acrylonitrile	23630	752 J	271 J	24653
Benzene	116690 J	106759 J	56584 J	280033
Bromobenzene	< 2000 R	< 200 R	< 200 R	2400
Bromochloromethane	< 2000 U	< 200 U	< 200 U	2400
Bromoform	< 2000 R	< 200 R	< 200 R	2400
Bromomethane	< 2000 U	< 200 U	< 200 U	2400
Carbon disulfide	22440	91 J	549 J	23080
Carbon tetrachloride	< 2000 U	< 200 U	< 200 U	2400
Chlorobenzene	< 2000 R	< 200 R	< 200 R	2400
Chloroethane	< 2000 U	< 200 U	< 200 U	2400
Chloroform	2970 J	1406 J	611 J	4987
Chloromethane	9490 J	27956 J	9357 J	46803
cis-1,2-Dichloroethene	< 2000 U	2515	622 J	5137
cis-1,3-Dichloropropene	< 2000 U	< 200 U	< 200 U	2400
Dibromochloromethane	< 2000 U	< 200 U	< 200 U	2400
Dibromomethane	< 2000 U	< 200 U	< 200 U	2400
Dichlorodifluoromethane	< 2000 UJ	973 J	1626 J	4599
Ethylbenzene	9700 R	6591 R	3102 R	19393
Hexachlorobutadiene	< 2000 R	< 200 R	< 200 R	2400
Isopropyl benzene	1800 R J	819 R J	372 R J	2991
m/p-Xylene	27000 R	17432 R	7965 R	52397
Methylene chloride	34030	7808	3089	44927
n-Butylbenzene	3030 R	< 3943 R	< 741 R	7714
n-Propylbenzene	5230 R	8142 R	1792 R J	15164
o-Xylene	9630 R	6582 R	2577 R	18789
p-Isopropyltoluene	5710 R	3369 R	801 R J	9880
sec-Butylbenzene	630 R J	278 R J	114 R J	1022
Styrene	40150 R	22777 R	8662 R	71589
tert-Butylbenzene	450 R J	< 375 R	< 200 R	1025
Tetrachloroethylene	< 2000 U	< 200 U	< 200 U	2400
Toluene	81590 J	51285 J	19784	152659
trans-1,2-Dichloroethene	< 2000 U	573 J	< 200 U	2773
trans-1,3-Dichloropropene	< 2000 U	< 200 U	< 200 U	2400
Trichloroethene	1860 J	7445	3208	12513
Trichlorofluoromethane	< 2000 UJ	4885	2479	9364
Vinyl chloride	< 2000 UJ	8595 J	1293 J	11888

Table G-1C
VOC Run 2 Inlet

ORIGINAL (Red)

RUN #2 INLET	VOST Tube #1 R2-I3-T/TC 1L VOST Subtotal	VOST Tube #2 R2-I4-T/TC 0.5L VOST Subtotal	VOST Tube #3 R2-I1-T/TC 0.5L VOST Subtotal	Sample Total
	ng	ng		ng
1,1,1,2-Tetrachloroethane	< 2000 U	< 2000 U	< 2000 U	6000
1,1,1-Trichloroethane	< 2000 U	< 2000 U	113850	117850
1,1,2,2-Tetrachloroethane	< 2000 R	< 2000 R	< 2000 R	6000
1,1,2-Trichloroethane	< 2000 U	< 20300 U	< 2000 U	24300
1,1-Dichloroethane	1010	410	< 2000 U	3420
1,1-Dichloroethene	< 2000 U	< 2000 U	< 2000 U	6000
1,1-Dichloropropene	< 2000 U	160	< 2000 U	4160
1,2,3-Trichlorobenzene	780 R	1460 R	< 2000 R	4240
1,2,3-Trichloropropane	< 2000 R	< 2000 R	24590 R	28590
1,2,4-Trichlorobenzene	690 R	1780 R	203320 R	205790
1,2,4-Trimethylbenzene	76030 R	52960 R	43510 R	172500
1,2-Dibromo-3-chloropropane	< 2000 R	< 2000 R	< 2000 R	6000
1,2-Dibromoethane	< 2000 U	< 2000 U	< 2000 U	6000
1,2-Dichlorobenzene	930 R	750 R	< 2000 R	3680
1,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
1,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
1,3,5-Trimethylbenzene	78640 R	50770 R	< 2000 R	131410
1,3-Butadiene	4771090 J E	1935170 J E	< 2000 UJ	6708260
1,3-Dichlorobenzene	1100 R	1000 R	< 2000 R	4100
1,3-Dichloropropane	< 2000 U	410	< 2000 U	4410
1,4-Dichlorobenzene	960 R	940 R	2327590 R E	2329490
2,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
2-Chlorotoluene	19620 R	9300 R	< 2000 R	30920
4-Chlorotoluene	9210 R	< 2760 R	< 2000 R	13970
Acrylonitrile	22120	12610	< 2000 U	36730
Benzene	1292160 J E	466900 J	< 2000 U	1761060
Bromobenzene	1250 R	560 R	1211690 R E	1213500
Bromochloromethane	< 2000 U	< 2000 U	< 2000 U	6000
Bromoform	< 2000 R	< 2000 R	< 2000 R	6000
Bromomethane	66710	< 2000 U	< 2000 U	70710
Carbon disulfide	13560	8630	< 2000 U	24190
Carbon tetrachloride	< 2000 U	< 2000 U	< 2000 U	6000
Chlorobenzene	2380 R	< 2000 R	< 2000 R	6380
Chloroethane	2340	< 2000 U	< 2000 U	6340
Chloroform	7880	4880	< 2000 U	14760
Chloromethane	154460 J	45240 J	179210 J	378910
cis-1,2-Dichloroethene	< 2000 U	< 2000 U	456980	460980
cis-1,3-Dichloropropene	< 2000 U	< 2000 U	147110	151110
Dibromochloromethane	< 2000 U	< 2000 U	454880	458880
Dibromomethane	< 2000 U	< 2000 U	< 2000 U	6000
Dichlorodifluoromethane	< 2000 UJ	< 2000 UJ	10980 J	14980
Ethylbenzene	128580 R	44540 R	< 2000 R	175120
Hexachlorobutadiene	< 2000 R	1630 R	< 2000 R	5630
Isopropyl benzene	8470 R	4810 R	< 2000 R	15280
m/p-Xylene	319950 R	115770 R	24850 R	460570
Methylene chloride	57320	231450	127900	416670
Naphthalene	87650	122300 E	91710	301660
n-Butylbenzene	16310 R	12830 R	< 2000 R	31140
n-Propylbenzene	84140 R	47340 R	< 2000 R	133480
o-Xylene	110750 R	45170 R	68550 R	224470
p-Isopropyltoluene	35950 R	27130 R	940 R	64020
sec-Butylbenzene	1600 R	1280 R	55280 R	58160
Styrene	374540 R	130870 R	< 2000 R	507410
tert-Butylbenzene	2810 R	1410 R	< 2000 R	6220
Tetrachloroethylene	< 2000 U	< 2000 U	< 2000 U	6000
Toluene	679870 J E	243790 J	410	924070
trans-1,2-Dichloroethene	< 2000 U	< 2000 U	< 2000 U	6000
trans-1,3-Dichloropropene	< 2000 U	< 2000 U	< 2000 U	6000
Trichloroethene	2780	1890	< 2000 U	6670
Trichlorofluoromethane	< 2000 U	< 2000 U	35080	39080
Vinyl chloride	< 2000 UJ	< 2000 UJ	< 2000 UJ	6000

ORIGINAL (Red)

Table G-1D
VOC Run 2 Outlet

	VOST Tube #1	VOST Tube #2	VOST Tube #3	
	R2-O2-T/TC 10L	R2-O3-T/TC 10L	R2-O4-T/TC 5L	
RUN #2 OUTLET	VOST Subtotal	VOST Subtotal	VOST Subtotal	Sample Total
	ng	ng	ng	ng
1,1,1,2-Tetrachloroethane	< 200 U	< 200 U	< 200 U	600
1,1,1-Trichloroethane	< 200 U	1296 J	< 200 U J	1696
1,1,2,2-Tetrachloroethane	< 200 R	< 200 R	< 200 R	600
1,1,2-Trichloroethane	< 3812 U	< 2415 U	< 1302 U	7529
1,1-Dichloroethane	< 200 U	3981	< 200 U	4381
1,1-Dichloroethene	< 200 U	864 J	< 200 U	1264
1,1-Dichloropropene	< 200 U	< 200 U	< 200 U	600
1,2,3-Trichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,2,3-Trichloropropane	< 200 R	< 200 R	< 200 R	600
1,2,4-Trichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,2,4-Trimethylbenzene	10574 R	10178 R	6968 R	27720
1,2-Dibromo-3-chloropropane	< 200 R	< 200 R	< 200 R	600
1,2-Dibromoethane	< 200 U	< 200 U	< 200 U	600
1,2-Dichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,2-Dichloropropane	< 200 U	< 200 U	< 200 U	600
1,2-Dichloropropane	< 200 U	< 200 U	< 200 U	600
1,3,5-Trimethylbenzene	7996 R	7627 R	4700 R	20323
1,3-Butadiene	102041 J	< 30107 J	16881 J	149029
1,3-Dichlorobenzene	< 200 R	< 200 R	152 R J	552
1,3-Dichloropropane	< 200 U	< 200 U	< 200 U	600
1,4-Dichlorobenzene	< 200 R	< 200 R	151 R J	551
2,2-Dichloropropane	< 200 U	< 200 U	< 200 U	600
2-Chlorotoluene	1280 R J	1229 R J	885 R J	3394
4-Chlorotoluene	419 R J	< 431 R	< 247 R	1097
Acrylonitrile	1497 J	524 J	172 J	2193
Benzene	72914 J	51003 J	34566	158483
Bromobenzene	< 200 R	< 200 R	< 200 R	600
Bromochloromethane	< 200 U	< 200 U	< 200 U	600
Bromoform	< 200 R	< 200 R	< 200 R	600
Bromomethane	13594	2276	< 200 U	16070
Carbon disulfide	3565	1253 J	235 J	5053
Carbon tetrachloride	< 200 U	< 200 U	< 200 U	600
Chlorobenzene	< 118 R	< 155 R	< 265 R	538
Chloroethane	< 200 U	< 200 U	< 200 U	600
Chloroform	< 200 U	422 J	118 J	740
Chloromethane	< 11006 UJ	2926 J	1412 J	15344
cis-1,2-Dichloroethene	< 200 U	137 J	< 200 U	537
cis-1,3-Dichloropropene	< 200 U	< 200 U	< 200 U	600
Dibromochloromethane	< 200 U	< 200 U	< 200 U	600
Dibromomethane	< 200 U	< 200 U	< 200 U	600
Dichlorodifluoromethane	< 200 UJ	< 200 UJ	< 200 UJ	600
Ethylbenzene	6500 R	5323 R	2973 R	14796
Hexachlorobutadiene	< 200 R	< 200 R	< 200 R	600
Isopropyl benzene	748 R J	612 R J	507 R J	1867
m/p-Xylene	16385 R	13195 R	7099 R	36679
Methylene chloride	2855	1580 J	829 J	5264
n-Butylbenzene	< 4177 R	< 4358 R	< 3620 R	12155
n-Propylbenzene	11832 R	5231 R	2421 R	19484
o-Xylene	5536 R	5074 R	2633 R	13243
p-Isopropyltoluene	6928 R	5444 R	4427 R	16799
sec-Butylbenzene	< 200 R	< 200 R	161 R J	561
Styrene	20240 R	16537 R	12070 R	48847
tert-Butylbenzene	< 401 R	< 331 R	< 235 R	967
Tetrachloroethylene	< 200 U	< 200 U	< 200 U	600
Toluene	56037 J	20593	10223	86853
trans-1,2-Dichloroethene	< 200 U	< 200 U	< 200 U	600
trans-1,3-Dichloropropene	< 200 U	< 200 U	< 200 U	600
Trichloroethene	< 200 U	1475 J	< 200 U	1875
Trichlorofluoromethane	< 200 U	185 J	< 200 U	585
Vinyl chloride	< 143 UJ	< 101 UJ	< 200 UJ	444

ORIGINAL (Red)

Table G-1E
VOC Run 3 Inlet

	VOST Tube #1	VOST Tube #2	VOST Tube #3	
	R3-I2-T/TC 1L	R3-I4-T/TC 1L		
RUN #3 INLET	VOST Subtotal	VOST Subtotal	VOST Subtotal	Sample Total
	ng	ng		ng
1,1,1,2-Tetrachloroethane	< 2000 U	< 2000 U	< 2000 U	6000
1,1,1-Trichloroethane	< 2000 U	< 2000 U	< 2000 U	6000
1,1,2,2-Tetrachloroethane	1360 R	< 2000 R	< 2000 R	5360
1,1,2-Trichloroethane	67580	62680	< 2000 U	132260
1,1-Dichloroethane	1740	< 1200 U	10520	13460
1,1-Dichloroethene	< 2000 U	< 2000 U	< 2000 U	6000
1,1-Dichloropropene	< 2000 U	< 2000 U	< 2000 U	6000
1,2,3-Trichlorobenzene	*2030* R	*810* R	*< 2000* R	*4840*
1,2,3-Trichloropropane	< 2000 R	< 2000 R	7400 R	11400
1,2,4-Trichlorobenzene	1890 R	1640 R	64370 R	67900
1,2,4-Trimethylbenzene	120030 R	64250 R	14870 R	199150
1,2-Dibromo-3-chloropropane	< 2000 R	< 2000 R	< 2000 R	6000
1,2-Dibromoethane	< 2000 U	< 2000 U	< 2000 U	6000
1,2-Dichlorobenzene	700 R	600 R	< 2000 R	3300
1,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
1,2-Dichloropropane	< 2000 U	< 2000 U	4780	8780
1,3,5-Trimethylbenzene	119190 R	64300 R	< 2000 R	185490
1,3-Butadiene	7435060 J E	7973240 J E	< 2000 UJ	15410300
1,3-Dichlorobenzene	840 R	560 R	< 2000 R	3400
1,3-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
1,4-Dichlorobenzene	1200 R	1240 R	226060 R	228500
2,2-Dichloropropane	< 2000 U	< 2000 U	< 2000 U	6000
2-Chlorotoluene	25190 R	14160 R	< 2000 R	41350
4-Chlorotoluene	12660 R	7080 R	< 2000 R	21740
Acrylonitrile	24500	45640	< 2000 U	72140
Benzene	838560 J E	449040 E	< 2000 U	1289600
Bromobenzene	< 2000 R	< 2000 R	51650 R	55650
Bromochloromethane	< 2000 U	< 2000 U	< 2000 U	6000
Bromoform	< 2000 R	< 2000 R	< 2000 R	6000
Bromomethane	< 2000 U	< 2000 U	< 2000 U	6000
Carbon disulfide	11470	14620	< 2000	28090
Carbon tetrachloride	< 2000 U	< 2000 U	< 2000 U	6000
Chlorobenzene	1800 R	1940 R	< 2000 R	5740
Chloroethane	< 2000 U	< 2000 U	< 2000 U	6000
Chloroform	880	< 2000 U	< 2000 U	4880
Chloromethane	238550 J	182180 J	2440 J	423170
cis-1,2-Dichloroethene	< 2000 U	< 2000 U	5920	9920
cis-1,3-Dichloropropene	< 2000 U	< 2000 U	1780	5780
Dibromochloromethane	< 2000 U	< 2000 U	5290	9290
Dibromomethane	< 2000 U	1130	< 2000 U	5130
Dichlorodifluoromethane	< 2000 UJ	< 2000 UJ	< 2000 UJ	6000
Ethylbenzene	129480 R	103190 R	< 2000 R	234670
Hexachlorobutadiene	1360 R	< 2000 R	< 2000 R	5360
Isopropyl benzene	10930 R	6830 R	< 2000 R	19760
m/p-Xylene	323400 R	249140 R	490 R	573030
Methylene chloride	116380	48670	460	165510
Naphthalene	637100 E	382170 E	< 2000 U	1021270
n-Butylbenzene	30850 R	15700 R	< 2000 R	48550
n-Propylbenzene	126030 R	68810 R	< 2000 R	196840
o-Xylene	119700 R	82610 R	950 R	203260
p-Isopropyltoluene	72750 R	37250 R	< 2000 R	112000
sec-Butylbenzene	1360 R	1220 R	< 2000 R	4580
Styrene	397650 R	283650 R	< 2000 R	683300
tert-Butylbenzene	< 5530 R	< 2830 R	< 2000 R	10360
Tetrachloroethylene	< 2000 U	< 2000 U	< 2000 U	6000
Toluene	889100 J E	965380 J E	< 2000 U	1856480
trans-1,2-Dichloroethene	< 2000 U	< 2000 U	< 2000 U	6000
trans-1,3-Dichloropropene	< 2000 U	< 2000 U	< 2000 U	6000
Trichloroethene	< 2000 U	2750	< 2000 U	6750
Trichlorofluoromethane	< 2000 U	< 2000 U	10900	14900
Vinyl chloride	< 2000 UJ	< 2000 UJ	< 2000 UJ	6000

ORIGINAL (Red)

Table G-1F
VOC Run 3 Outlet

RUN #3 OUTLET	VOST Tube #1	VOST Tube #2	VOST Tube #3	
	R3-O2-T/TC 10L	R3-O3-T/TC 10L	R3-O4-T/TC 5L	
	VOST Subtotal ng	VOST Subtotal ng	VOST Subtotal ng	Sample Total ng
1,1,1,2-Tetrachloroethane	< 200 U	< 200 U	< 200 U	600
1,1,1-Trichloroethane	< 200 U	< 200 U	< 200 U	600
1,1,2,2-Tetrachloroethane	868 R J	< 200 R	< 200 R	1268
1,1,2-Trichloroethane	< 3305 U	< 2210 U	< 772 U	6287
1,1-Dichloroethane	< 200 U	< 200 U	< 200 U	600
1,1-Dichloroethene	< 200 U	< 200 U	< 200 U	600
1,1-Dichloropropene	< 200 U	< 200 U	< 200 U	600
1,2,3-Trichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,2,3-Trichloropropane	< 200 R	< 200 R	< 200 R	600
1,2,4-Trichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,2,4-Trimethylbenzene	11677 R	7111 R	4402 R	23190
1,2-Dibromo-3-chloropropane	< 200 R	< 200 R	< 200 R	600
1,2-Dibromoethane	< 200 U	< 200 U	< 200 U	600
1,2-Dichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,2-Dichloropropane	< 200 U	< 200 U	< 200 U	600
1,2-Dichloropropane	< 200 U	< 200 U	< 200 U	600
1,3,5-Trimethylbenzene	9676 R	6121 R	3904 R	19701
1,3-Butadiene	101058 J	61846 J	17017 J	179921
1,3-Dichlorobenzene	< 200 R	< 200 R	< 200 R	600
1,3-Dichloropropane	< 200 U	< 200 U	< 200 U	600
1,4-Dichlorobenzene	< 200 R	< 200 R	< 200 R	600
2,2-Dichloropropane	< 200 U	< 200 U	< 200 U	600
2-Chlorotoluene	1871 R J	1531 R J	880 R J	4282
4-Chlorotoluene	< 1052 R	< 334 R	< 458 R	1844
Acrylonitrile	599 J	410 J	257 J	1266
Benzene	179205 J	125504 J	29822	334531
Bromobenzene	< 200 R	< 200 R	< 200 R	600
Bromochloromethane	< 200 U	< 200 U	< 200 U	600
Bromoform	< 200 R	< 200 R	< 200 R	600
Bromomethane	4735	1904	3136	9775
Carbon disulfide	2086	193 J	730 J	3009
Carbon tetrachloride	< 200 U	< 200 U	< 200 U	600
Chlorobenzene	< 200 R	< 401 R	< 134 R	735
Chloroethane	< 200 U	< 200 U	< 200 U	600
Chloroform	< 200 U	< 200 U	< 200 U	600
Chloromethane	12052 J	8483 J	1085 J	21620
cis-1,2-Dichloroethene	< 200 U	< 200 U	< 200 U	600
cis-1,3-Dichloropropene	< 200 U	< 200 U	< 200 U	600
Dibromochloromethane	< 200 U	< 200 U	< 200 U	600
Dibromomethane	< 200 U	< 200 U	< 200 U	600
Dichlorodifluoromethane	< 200 UJ	< 200 UJ	< 200 UJ	600
Ethylbenzene	8405 R	6340 R	3314 R	18059
Hexachlorobutadiene	< 200 R	< 200 R	< 200 R	600
Isopropyl benzene	933 R J	538 R J	406 R J	1877
m/p-Xylene	20572 R	16179 R	8392 R	45143
Methylene chloride	354 J	607 J	893 J	1854
n-Butylbenzene	< 4730 R	< 2973 R	< 1724 R	9427
n-Propylbenzene	5431 R	2921 R	3120 R	11472
o-Xylene	7733 R	5363 R	3518 R	16614
p-Isopropyltoluene	9194 R	4396 R	2895 R	16485
sec-Butylbenzene	< 200 R	126 R J	< 200 R	526
Styrene	32433 R	26380 R	10371 R	69184
tert-Butylbenzene	< 535 R	< 376 R	< 206 R	1117
Tetrachloroethylene	< 200 U	< 200 U	< 200 U	600
Toluene	39472	27126	16575	83173
trans-1,2-Dichloroethene	3441	< 200 U	< 200 U	3841
trans-1,3-Dichloropropene	< 200 U	< 200 U	< 200 U	600
Trichloroethene	< 200 U	< 200 U	< 200 U	600
Trichlorofluoromethane	< 200 U	< 200 U	< 200 U	600
Vinyl chloride	< 200 UJ	< 200 UJ	< 200 UJ	600

ORIGINAL (Red)

TABLE G-3
Stack Sampling Parameters

Sample Number	Location	Date	Time		Stack			
					Average Temperature	Average Volumetric Flow Rate	Average Moisture	Sample Volume
			Start	Stop	°F	DSCFM	%	DSCF
VOCs								
Continuous Run 1	Inlet	4/13/99			98.6	213	5.9	0.094
	Outlet	4/13/99	15:01	19:34	162.7	275	5.8	1.249
Continuous Run 2	Inlet	4/14/99			139.3	183	6.0	0.058
	Outlet	4/14/99	16:55	21:00	168.9	276	6.8	0.157
Continuous Run 3	Inlet	4/15/99			124.6	179	6.0	0.070
	Outlet	4/15/99	7:40	11:45	163.9	275	6.3	0.876
Dioxins/Furans/SVOCs/PAHs								
Continuous Run 1	Outlet	4/13/99			163.8	272	5.8	161.236
Continuous Run 2	Outlet	4/14/99			169.3	274	7.6	166.708
Continuous Run 3	Outlet	4/15/99			163.9	275	6.3	169.030

Table G-4A: VOC Run 1

	Actual							Maximum Allowable			Pass/Fail	
	Inlet			Outlet								
VOC	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	DRE (%)	Mass Emission Rate (1-hr) (g/s)	Mass Emission Rate (8-hr) (g/s)	Mass Emission Rate (annual) (g/s)	Inlet	Outlet
1,1,1,2-Tetrachloroethane	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		1.58E-02		pass	pass
1,1,1-Trichloroethane	6000	2.3	2.59E-04	5533	0.2	2.03E-05	92.1%	9.90E+00	1.10E+01		pass	pass
1,1,2,2-Tetrachloroethane*	4450	1.7	1.92E-04	2400	0.1	8.80E-06	95.4%		3.97E-02		pass	pass
1,1,2-Trichloroethane	32030	12.0	1.38E-03	16587	0.5	6.08E-05	95.6%		3.16E-01		pass	pass
1,1-Dichloroethane	4780	1.8	2.06E-04	60205	1.7	2.21E-04	-7.2%		2.30E-01	2.01E-03	pass	pass
1,1-Dichloroethene	5560	2.1	2.40E-04	43318	1.2	1.59E-04	33.7%	3.18E-01	1.15E-01		pass	pass
1,1-Dichloropropene	3220	1.2	1.39E-04	2400	0.1	8.80E-06	93.7%		2.59E-02	2.01E-03	pass	pass
1,2,3-Trichlorobenzene*	3960	1.5	1.71E-04	2400	0.1	8.80E-06	94.8%		4.37E-02		pass	pass
1,2,3-Trichloropropane*	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		3.45E-01		pass	pass
1,2,4-Trichlorobenzene*	5000	1.9	2.15E-04	1520	0.04	5.58E-06	97.4%		2.13E-01		pass	pass
1,2,4-Trimethylbenzene*	46180	17.4	1.99E-03	22412	0.6	8.22E-05	95.9%		1.21E-01		pass	pass
1,2-Dibromo-3-chloropropane*	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		5.58E-03	7.35E-02	pass	pass
1,2-Dibromoethane	4640	1.7	2.00E-04	1020	0.03	3.74E-06	98.1%		8.22E-01	2.52E-04	pass	pass
1,2-Dichlorobenzene*	2490	0.9	1.07E-04	1080	0.03	3.96E-06	96.3%	1.21E+00	8.63E-01		pass	pass
1,2-Dichloropropane	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%	2.05E+00	2.00E+00		pass	pass
1,2-Dichloropropane	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%	2.05E+00	2.00E+00		pass	pass
1,3,5-Trimethylbenzene*	53450	20.1	2.30E-03	20815	0.6	7.64E-05	96.7%		1.38E+00		pass	pass
1,3-Butadiene*	7212880	2711.6	3.11E-01	609719	17.2	2.24E-03	99.3%		2.53E-02	2.01E-03	FAIL	FAIL
1,3-Dichlorobenzene*	2690	1.0	1.16E-04	1160	0.03	4.26E-06	96.3%		4.03E-01		pass	pass
1,3-Dichloropropane	4410	1.7	1.90E-04	790	0.02	2.90E-06	98.5%		2.01E-01		pass	pass
1,4-Dichlorobenzene*	2430	0.9	1.05E-04	8620	0.2	3.16E-05	69.8%		3.45E-01	7.35E-03	pass	pass
2,2-Dichloropropane	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%					
2-Chlorotoluene*	16190	6.1	6.98E-04	5270	0.1	1.93E-05	97.2%		2.76E+00		pass	pass
4-Chlorotoluene*	4140	1.6	1.78E-04	1847	0.1	6.78E-06	96.2%		1.96E+00		pass	pass
Acrylonitrile	29060	10.9	1.25E-03	24653	0.7	9.04E-05	92.8%		2.47E-02	8.05E-04	FAIL	pass
Benzene	1333620	501.4	5.75E-02	280033	7.9	1.03E-03	98.2%	3.22E-02	9.20E-03	6.09E-03	FAIL	pass
Bromobenzene*	4080	1.5	1.76E-04	2400	0.1	8.80E-06	95.0%		1.17E+00		pass	pass
Bromochloromethane	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		6.10E+00		pass	pass
Bromoform*	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		2.99E-02		pass	pass
Bromomethane	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		2.24E-02		pass	pass
Carbon disulfide	30540	11.5	1.32E-03	23080	0.7	8.47E-05	93.6%		1.78E-01		pass	pass
Carbon tetrachloride	6000	2.3	2.59E-04	2400	0.1	8.80E-06	96.6%		1.78E-04		FAIL	pass
Chlorobenzene*	5570	2.1	2.40E-04	2400	0.1	8.80E-06	96.3%		2.65E-01		pass	pass
Chloroethane	6670	2.5	2.87E-04	2400	0.1	8.80E-06	96.9%	5.23E-03	1.50E-03		pass	pass
Chloroform	12200	4.6	5.26E-04	4987	0.1	1.83E-05	96.5%		2.82E-04		FAIL	pass
Chloromethane*	438100	164.7	1.89E-02	46803	1.3	1.72E-04	99.1%	2.11E-01	6.04E-02		pass	pass

ORIGINAL (Red)

Table G-4A: VOC Run 1

	Actual							Maximum Allowable			Pass/Fail	
	Inlet			Outlet								
VOC	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	DRE (%)	Mass Emission Rate (1-hr) (g/s)	Mass Emission Rate (8-hr) (g/s)	Mass Emission Rate (annual) (g/s)	Inlet	Outlet
cis-1,2-Dichloroethene	6000	2.3	2.59E-04 U	5137	0.1	1.88E-05	92.7%		4.56E+00		pass	pass
cis-1,3-Dichloropropene	6000	2.3	2.59E-04 U	2400	0.1	8.80E-06 U	96.6%		2.59E-02	1.36E-03	pass	pass
Dibromochloromethane	6000	2.3	2.59E-04 U	2400	0.1	8.80E-06 U	96.6%		2.00E-02		pass	pass
Dibromomethane	6000	2.3	2.59E-04 U	2400	0.1	8.80E-06 U	96.6%		8.18E-01		pass	pass
Dichlorodifluoromethane*	5700	2.1	2.46E-04 J	4599	0.1	1.69E-05 J	93.1%		2.85E+01		pass	pass
Ethylbenzene*	76020	28.6	3.28E-03 R	19393	0.5	7.11E-05 R	97.8%	2.19E+00	2.50E+00		pass	pass
Hexachlorobutadiene*	6000	2.3	2.59E-04 R	2400	0.1	8.80E-06 R	96.6%		1.21E-03		pass	pass
Isopropyl benzene*	9180	3.5	3.96E-04 R	2991	0.1	1.10E-05 R	97.2%		1.41E+00		pass	pass
m/p-Xylene*	196160	73.7	8.45E-03 R	52397	1.5	1.92E-04 R	97.7%	2.62E+00	2.50E+00		pass	pass
Methylene chloride	53990	20.3	2.33E-03	44927	1.3	1.65E-04	92.9%		1.00E-03		*FAIL*	pass
Naphthalene*	175410	65.9	7.56E-03 R	741779	21.0	2.72E-03 R	64.0%	3.18E-01	2.99E-01		pass	pass
n-Butylbenzene*	11630	4.4	5.01E-04 R	7714	0.2	2.83E-05 R	94.4%		2.03E-01		pass	pass
n-Propylbenzene *	52850	19.9	2.28E-03 R	15164	0.4	5.56E-05 R	97.6%		1.84E+01		pass	pass
o-Xylene*	70010	26.3	3.02E-03 R	18789	0.5	6.89E-05 R	97.7%	2.62E+00	2.50E+00		pass	pass
p-Isopropyltoluene*	18850	7.1	8.12E-04 R	9880	0.3	3.62E-05 R	95.5%		1.12E-01		pass	pass
sec-Butylbenzene*	3240	1.2	1.40E-04 R	1022	0.0	3.75E-06 R	97.3%		1.04E-01		pass	pass
Styrene*	238080	89.5	1.03E-02 R	71589	2.0	2.63E-04 R	97.4%	6.84E-01	4.89E-01		pass	pass
tert-Butylbenzene*	3850	1.4	1.66E-04 R	1025	0.03	3.76E-06 R	97.7%		2.05E-01		pass	pass
Tetrachloroethylene	6000	2.3	2.59E-04 U	2400	0.1	8.80E-06 U	96.6%	2.76E+00	9.78E-01		pass	pass
Toluene	615280	231.3	2.65E-02	152659	4.3	5.60E-04 J	97.9%		1.08E+00		pass	pass
trans-1,2-Dichloroethene	5180	1.9	2.23E-04	2773	0.1	1.02E-05 J	95.4%		4.56E+00		pass	pass
trans-1,3-Dichloropropene	6000	2.3	2.59E-04 U	2400	0.1	8.80E-06 U	96.6%		2.59E-02	1.36E-03	pass	pass
Trichloroethene	5490	2.1	2.37E-04	12513	0.4	4.59E-05 J	80.6%	2.16E+00	1.55E+00		pass	pass
Trichlorofluoromethane*	6000	2.3	2.59E-04 U	9364	0.3	3.43E-05	86.7%	2.26E+01			pass	pass
Vinyl chloride*	5230	2.0	2.25E-04 J	11888	0.3	4.36E-05 J	80.6%		7.48E-02	5.89E-04	pass	pass

*analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.

ORIGINAL (Red)

Table G-4B: VOC Run 2

	Actual							Maximum Allowable			Pass/Fail	
	Inlet			Outlet								
VOC	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	DRE (%)	Mass Emission Rate (1-hr) (g/s)	Mass Emission Rate (8-hr) (g/s)	Mass Emission Rate (annual) (g/s)	Inlet	Outlet
1,1,1,2-Tetrachloroethane	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%		1.58E-02		pass	pass
1,1,1-Trichloroethane	117850	44.3	2.70E-03	1696	0.05	6.49E-06 J	99.8%	9.90E+00	1.10E+01		pass	pass
— 1,1,2,2-Tetrachloroethane*	6000	2.3	1.38E-04 R	600	0.02	2.30E-06 R	98.3%		3.97E-02		pass	pass
1,1,2-Trichloroethane	24300	9.1	5.57E-04 U	7529	0.2	2.88E-05 J	94.8%		3.16E-01		pass	pass
1,1-Dichloroethane	3420	1.3	7.84E-05	4381	0.1	1.68E-05	78.6%		2.30E-01	2.01E-03	pass	pass
1,1-Dichloroethene	6000	2.3	1.38E-04 U	1264	0.04	4.84E-06 J	96.5%	3.18E-01	1.15E-01		pass	pass
1,1-Dichloropropene	4160	1.6	9.54E-05	600	0.02	2.30E-06 U	97.6%		2.59E-02	2.01E-03	pass	pass
1,2,3-Trichlorobenzene*	4240	1.6	9.72E-05 R	600	0.02	2.30E-06 R	97.6%		4.37E-02		pass	pass
1,2,3-Trichloropropane*	28590	10.7	6.55E-04 R	600	0.02	2.30E-06 R	99.6%		3.45E-01		pass	pass
— 1,2,4-Trichlorobenzene*	205790	77.4	4.72E-03 R	600	0.02	2.30E-06 R	100.0%		2.13E-01		pass	pass
1,2,4-Trimethylbenzene*	172500	64.8	3.95E-03 R	27720	0.8	1.06E-04 R	97.3%		1.21E-01		pass	pass
1,2-Dibromo-3-chloropropane*	6000	2.3	1.38E-04 R	600	0.02	2.30E-06 R	98.3%		5.58E-03	7.35E-02	pass	pass
1,2-Dibromoethane	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%		8.22E-01	2.52E-04	pass	pass
1,2-Dichlorobenzene*	3680	1.4	8.44E-05 R	600	0.02	2.30E-06 R	97.3%	1.21E+00	8.63E-01		pass	pass
1,2-Dichloropropane	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%	2.05E+00	2.00E+00		pass	pass
1,2-Dichloropropane	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%	2.05E+00	2.00E+00		pass	pass
— 1,3,5-Trimethylbenzene*	131410	49.4	3.01E-03 R	20323	0.6	7.78E-05 R	97.4%		1.38E+00		pass	pass
1,3-Butadiene*	6708260	2521.9	1.54E-01 J	149029	4.2	5.71E-04 J	99.6%		2.53E-02	2.01E-03	FAIL	pass
1,3-Dichlorobenzene*	4100	1.5	9.40E-05 R	552	0.02	2.11E-06 R	97.8%		4.03E-01		pass	pass
1,3-Dichloropropane	4410	1.7	1.01E-04	600	0.02	2.30E-06 U	97.7%		2.01E-01		pass	pass
1,4-Dichlorobenzene*	2329490	875.7	5.34E-02 R	551	0.02	2.11E-06 R	100.0%		3.45E-01	7.35E-03	FAIL	pass
2,2-Dichloropropane	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%					
2-Chlorotoluene*	30920	11.6	7.09E-04 R	3394	0.1	1.30E-05 R	98.2%		2.76E+00		pass	pass
— 4-Chlorotoluene*	13970	5.3	3.20E-04 R	1097	0.03	4.20E-06 R	98.7%		1.96E+00		pass	pass
Acrylonitrile	36730	13.8	8.42E-04	2193	0.1	8.40E-06 J	99.0%		2.47E-02	8.05E-04	FAIL	pass
Benzene	1761060	662.1	4.04E-02 J	158483	4.5	6.07E-04 J	98.5%	3.22E-02	9.20E-03	6.09E-03	FAIL	pass
Bromobenzene*	1213500	456.2	2.78E-02 R	600	0.02	2.30E-06 R	100.0%		1.17E+00		pass	pass
Bromochloromethane	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%		6.10E+00		pass	pass
Bromoform*	6000	2.3	1.38E-04 R	600	0.02	2.30E-06 R	98.3%		2.99E-02		pass	pass
Bromomethane	70710	26.6	1.62E-03	16070	0.5	6.15E-05	96.2%		2.24E-02		pass	pass
Carbon disulfide	24190	9.1	5.55E-04	5053	0.1	1.93E-05 J	96.5%		1.78E-01		pass	pass
Carbon tetrachloride	6000	2.3	1.38E-04 U	600	0.02	2.30E-06 U	98.3%		1.78E-04		pass	pass
Chlorobenzene*	6380	2.4	1.46E-04 R	538	0.02	2.06E-06 R	98.6%		2.65E-01		pass	pass
Chloroethane	6340	2.4	1.45E-04	600	0.02	2.30E-06 U	98.4%	5.23E-03	1.50E-03		pass	pass
Chloroform	14760	5.5	3.38E-04	740	0.02	2.83E-06 J	99.2%		2.82E-04		FAIL	pass
Chloromethane*	378910	142.4	8.69E-03 J	15344	0.4	5.87E-05 J	99.3%	2.11E-01	6.04E-02		pass	pass

ORIGINAL (Red)

Table G-4B: VOC Run 2

	Actual							Maximum Allowable			Pass/Fail	
	Inlet			Outlet								
VOC	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	DRE (%)	Mass Emission Rate (1-hr) (g/s)	Mass Emission Rate (8-hr) (g/s)	Mass Emission Rate (annual) (g/s)	Inlet	Outlet
cis-1,2-Dichloroethene	460980	173.3	1.06E-02	537	0.02	2.06E-06	100.0%		4.56E+00		pass	pass
cis-1,3-Dichloropropene	151110	56.8	3.46E-03	600	0.02	2.30E-06	99.9%		2.59E-02	1.36E-03	FAIL	pass
Dibromochloromethane	458880	172.5	1.05E-02	600	0.02	2.30E-06	100.0%		2.00E-02		pass	pass
Dibromomethane	6000	2.3	1.38E-04	600	0.02	2.30E-06	98.3%		8.18E-01		pass	pass
Dichlorodifluoromethane*	14980	5.6	3.43E-04	600	0.02	2.30E-06	99.3%		2.85E+01		pass	pass
Ethylbenzene*	175120	65.8	4.01E-03	14796	0.4	5.67E-05	98.6%	2.19E+00	2.50E+00		pass	pass
Hexachlorobutadiene*	5630	2.1	1.29E-04	600	0.02	2.30E-06	98.2%		1.21E-03		pass	pass
Isopropyl benzene*	15280	5.7	3.50E-04	1867	0.1	7.15E-06	98.0%		1.41E+00		pass	pass
m/p-Xylene*	460570	173.1	1.06E-02	36679	1.0	1.40E-04	98.7%	2.62E+00	2.50E+00		pass	pass
Methylene chloride	416670	156.6	9.55E-03	5264	0.1	2.02E-05	99.8%		1.00E-03		FAIL	pass
Naphthalene*	301660	113.4	6.92E-03	1558566	44.1	5.97E-03	13.7%	3.18E-01	2.99E-01		pass	pass
n-Butylbenzene*	31140	11.7	7.14E-04	12155	0.3	4.65E-05	93.5%		2.03E-01		pass	pass
n-Propylbenzene*	133480	50.2	3.06E-03	19484	0.6	7.46E-05	97.6%		1.84E+01		pass	pass
o-Xylene*	224470	84.4	5.15E-03	13243	0.4	5.07E-05	99.0%	2.62E+00	2.50E+00		pass	pass
p-Isopropyltoluene*	64020	24.1	1.47E-03	16799	0.5	6.43E-05	95.6%		1.12E-01		pass	pass
sec-Butylbenzene*	58160	21.9	1.33E-03	561	0.02	2.15E-06	99.8%		1.04E-01		pass	pass
Styrene*	507410	190.8	1.16E-02	48847	1.4	1.87E-04	98.4%	6.84E-01	4.89E-01		pass	pass
tert-Butylbenzene*	6220	2.3	1.43E-04	967	0.03	3.70E-06	97.4%		2.05E-01		pass	pass
Tetrachloroethylene	6000	2.3	1.38E-04	600	0.02	2.30E-06	98.3%	2.76E+00	9.78E-01		pass	pass
Toluene	924070	347.4	2.12E-02	86853	2.5	3.33E-04	98.4%		1.08E+00		pass	pass
trans-1,2-Dichloroethene	6000	2.3	1.38E-04	600	0.02	2.30E-06	98.3%		4.56E+00		pass	pass
trans-1,3-Dichloropropene	6000	2.3	1.38E-04	600	0.02	2.30E-06	98.3%		2.59E-02	1.36E-03	pass	pass
Trichloroethene	6670	2.5	1.53E-04	1875	0.1	7.18E-06	95.3%	2.16E+00	1.55E+00		pass	pass
Trichlorofluoromethane*	39080	14.7	8.96E-04	585	0.02	2.24E-06	99.7%	2.26E+01			pass	pass
Vinyl chloride*	6000	2.3	1.38E-04	444	0.0	1.70E-06	98.8%		7.48E-02	5.89E-04	pass	pass

*analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.

ORIGINAL

Table G-4C: VOC Run 3

	Actual							Maximum Allowable			Pass/Fail	
	Inlet			Outlet								
	Sample Total Mass	Sample Conc.	Mass Emission Rate	Sample Total Mass	Sample Conc.	Mass Emission Rate	DRE	Mass Emission Rate (1-hr)	Mass Emission Rate (8-hr)	Mass Emission Rate (annual)	Inlet	Outlet
VOC	(ng)	(ug/m^3)	(g/s)	(ng)	(ug/m^3)	(g/s)	(%)	(g/s)	(g/s)	(g/s)		
1,1,1,2-Tetrachloroethane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		1.58E-02		pass	pass
1,1,1-Trichloroethane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%	9.90E+00	1.10E+01		pass	pass
1,1,2,2-Tetrachloroethane *	5360	2.0	1.85E-04 R	1268	0.04	6.63E-06 R	96.4%		3.97E-02		pass	pass
1,1,2-Trichloroethane	132260	49.7	4.58E-03	6287	0.2	3.29E-05 U	99.3%		3.16E-01		pass	pass
1,1-Dichloroethane	13460	5.1	4.66E-04	600	0.02	3.14E-06 U	99.3%		2.30E-01	2.01E-03	pass	pass
1,1-Dichloroethene	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%	3.18E-01	1.15E-01		pass	pass
1,1-Dichloropropene	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		2.59E-02	2.01E-03	pass	pass
1,2,3-Trichlorobenzene*	4840	1.8	1.67E-04 R	600	0.02	3.14E-06 R	98.1%		4.37E-02		pass	pass
1,2,3-Trichloropropane*	11400	4.3	3.94E-04 R	600	0.02	3.14E-06 R	99.2%		3.45E-01		pass	pass
1,2,4-Trichlorobenzene *	67900	25.5	2.35E-03 R	600	0.02	3.14E-06 R	99.9%		2.13E-01		pass	pass
1,2,4-Trimethylbenzene*	199150	74.9	6.89E-03 R	23190	0.7	1.21E-04 R	98.2%		1.21E-01		pass	pass
1,2-Dibromo-3-chloropropane*	6000	2.3	2.08E-04 R	600	0.02	3.14E-06 R	98.5%		5.58E-03	7.35E-02	pass	pass
1,2-Dibromoethane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		8.22E-01	2.52E-04	pass	pass
1,2-Dichlorobenzene*	3300	1.2	1.14E-04 R	600	0.02	3.14E-06 R	97.3%	1.21E+00	8.63E-01		pass	pass
1,2-Dichloropropane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%	2.05E+00	2.00E+00		pass	pass
1,2-Dichloropropane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%	2.05E+00	2.00E+00		pass	pass
1,3,5-Trimethylbenzene *	185490	69.7	6.42E-03 R	19701	0.6	1.03E-04 R	98.4%		1.38E+00		pass	pass
1,3-Butadiene*	15410300	5793.3	5.33E-01 J	179921	5.1	9.41E-04 J	99.8%		2.53E-02	2.01E-03	FAIL	pass
1,3-Dichlorobenzene*	3400	1.3	1.18E-04 R	600	0.02	3.14E-06 R	97.3%		4.03E-01		pass	pass
1,3-Dichloropropane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		2.01E-01		pass	pass
1,4-Dichlorobenzene*	228500	85.9	7.91E-03 R	600	0.02	3.14E-06 R	100.0%		3.45E-01	7.35E-03	FAIL	pass
2,2-Dichloropropane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%					
2-Chlorotoluene*	41350	15.5	1.43E-03 R	4282	0.1	2.24E-05 R	98.4%		2.76E+00		pass	pass
4-Chlorotoluene *	21740	8.2	7.52E-04 R	1844	0.1	9.65E-06 R	98.7%		1.96E+00		pass	pass
Acrylonitrile	72140	27.1	2.50E-03	1266	0.04	6.62E-06 J	99.7%		2.47E-02	8.05E-04	FAIL	pass
Benzene	1289600	484.8	4.46E-02 J	334531	9.5	1.75E-03 J	96.1%	3.22E-02	9.20E-03	6.09E-03	FAIL	pass
Bromobenzene*	55650	20.9	1.93E-03 R	600	0.02	3.14E-06 R	99.8%		1.17E+00		pass	pass
Bromochloromethane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		6.10E+00		pass	pass
Bromoform*	6000	2.3	2.08E-04 R	600	0.02	3.14E-06 R	98.5%		2.99E-02		pass	pass
Bromomethane	6000	2.3	2.08E-04 U	9775	0.3	5.11E-05	75.4%		2.24E-02		pass	pass
Carbon disulfide	28090	10.6	9.72E-04	3009	0.1	1.57E-05 J	98.4%		1.78E-01		pass	pass
Carbon tetrachloride	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		1.78E-04		FAIL	pass
Chlorobenzene*	5740	2.2	1.99E-04 R	735	0.02	3.85E-06 R	98.1%		2.65E-01		pass	pass
Chloroethane	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%	5.23E-03	1.50E-03		pass	pass
Chloroform	4880	1.8	1.69E-04	600	0.02	3.14E-06 U	98.1%		2.82E-04		pass	pass
Chloromethane*	423170	159.1	1.46E-02 J	21620	0.6	1.13E-04 J	99.2%	2.11E-01	6.04E-02		pass	pass

Table G-4C: VOC Run 3

	Actual							Maximum Allowable			Pass/Fail	
	Inlet			Outlet								
VOC	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	Sample Total Mass (ng)	Sample Conc. (ug/m^3)	Mass Emission Rate (g/s)	DRE (%)	Mass Emission Rate (1-hr) (g/s)	Mass Emission Rate (8-hr) (g/s)	Mass Emission Rate (annual) (g/s)	Inlet	Outlet
cis-1,2-Dichloroethene	9920	3.7	3.43E-04	600	0.02	3.14E-06 U	99.1%		4.56E+00		pass	pass
cis-1,3-Dichloropropene	5780	2.2	2.00E-04	600	0.02	3.14E-06 U	98.4%		2.59E-02	1.36E-03	pass	pass
Dibromochloromethane	9290	3.5	3.21E-04	600	0.02	3.14E-06 U	99.0%		2.00E-02		pass	pass
Dibromomethane	5130	1.9	1.78E-04	600	0.02	3.14E-06 U	98.2%		8.18E-01		pass	pass
Dichlorodifluoromethane*	6000	2.3	2.08E-04 UJ	600	0.02	3.14E-06 UJ	98.5%		2.85E+01		pass	pass
Ethylbenzene*	234670	88.2	8.12E-03 R	18059	0.5	9.45E-05 R	98.8%	2.19E+00	2.50E+00		pass	pass
Hexachlorobutadiene*	5360	2.0	1.85E-04 R	600	0.0	3.14E-06 R	98.3%		1.21E-03		pass	pass
Isopropyl benzene*	19760	7.4	6.84E-04 R	1877	0.1	9.82E-06 R	98.6%		1.41E+00		pass	pass
m/p-Xylene*	573030	215.4	1.98E-02 R	45143	1.3	2.36E-04 R	98.8%	2.62E+00	2.50E+00		pass	pass
Methylene chloride	165510	62.2	5.73E-03	1854	0.1	9.70E-06 J	99.8%		1.00E-03		*FAIL*	pass
Naphthalene*	1021270	383.9	3.53E-02 R	1369031	38.7	7.16E-03 R	79.7%	3.18E-01	2.99E-01		pass	pass
n-Butylbenzene*	48550	18.3	1.68E-03 R	9427	0.3	4.93E-05 R	97.1%		2.03E-01		pass	pass
n-Propylbenzene*	196840	74.0	6.81E-03 R	11472	0.3	6.00E-05 R	99.1%		1.84E+01		pass	pass
o-Xylene*	203260	76.4	7.03E-03 R	16614	0.5	8.69E-05 R	98.8%	2.62E+00	2.50E+00		pass	pass
p-Isopropyltoluene*	112000	42.1	3.88E-03 R	16485	0.5	8.63E-05 R	97.8%		1.12E-01		pass	pass
sec-Butylbenzene*	4580	1.7	1.58E-04 R	526	0.01	2.75E-06 R	98.3%		1.04E-01		pass	pass
Styrene*	683300	256.9	2.36E-02 R	69184	2.0	3.62E-04 R	98.5%	6.84E-01	4.89E-01		pass	pass
tert-Butylbenzene*	10360	3.9	3.58E-04 R	1117	0.03	5.84E-06 R	98.4%		2.05E-01		pass	pass
Tetrachloroethylene	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%	2.76E+00	9.78E-01		pass	pass
Toluene	1856480	697.9	6.42E-02 J	83173	2.4	4.35E-04	99.3%		1.08E+00		pass	pass
trans-1,2-Dichloroethene	6000	2.3	2.08E-04 U	3841	0.1	2.01E-05	90.3%		4.56E+00		pass	pass
trans-1,3-Dichloropropene	6000	2.3	2.08E-04 U	600	0.02	3.14E-06 U	98.5%		2.59E-02	1.36E-03	pass	pass
Trichloroethene	6750	2.5	2.34E-04	600	0.02	3.14E-06 U	98.7%	2.16E+00	1.55E+00		pass	pass
Trichlorofluoromethane*	14900	5.6	5.16E-04	600	0.02	3.14E-06 U	99.4%	2.26E+01			pass	pass
Vinyl chloride*	6000	2.3	2.08E-04 UJ	600	0.02	3.14E-06 UJ	98.5%		7.48E-02	5.89E-04	pass	pass

analytes not appropriate for VOST sampling (boiling point <30C or >120C), results reported for information only.

Table G-5: SVOC Summary

Analyte	Continuous POP #2 Run 1 Outlet			Continuous POP #2 Run 2 Outlet			Continuous POP #2 Run 3 Outlet			Scenario 3 Maximum Allowable Mass Emission Rate			
	Sample Volume (DSCF) :		161.236	Sample Volume (DSCF) :		166.708	Sample Volume (DSCF) :		169.030				
	Stack Volumetric Flow Rate (DSCFM) :		272	Stack Volumetric Flow Rate (DSCFM) :		274	Stack Volumetric Flow Rate (DSCFM) :		275	(1-hr)	(8-hr)	(annual)	Pass/Fail
	Sample Mass (microgram)	Sample Conc. (g/DSCF)	Stack Mass Flow Rate (g/s)	Sample Mass (microgram)	Sample Conc. (g/DSCF)	Stack Mass Flow Rate (g/s)	Sample Mass (microgram)	Sample Conc. (g/DSCF)	Stack Mass Flow Rate (g/s)	(g/s)	(g/s)	(g/s)	Outlet
Detected SVOCs													
2,4-Dimethylphenol	116.92	7.25E-07	3.29E-06	257.48	1.54E-06	7.04E-06	51.80	3.06E-07	1.41E-06		7.55E-02		pass
2-Methylnaphthalene	33,988.21	2.11E-04	9.57E-04	21,163.50	1.27E-04	5.79E-04	19,222.24	1.14E-04	5.22E-04		3.85E-02		pass
2-Methylphenol	360.74	2.24E-06	1.02E-05	1,417.73	8.50E-06	3.88E-05	675.14	3.99E-06	1.83E-05		1.27E-01		pass
3,4-Methylphenol	443.04	2.75E-06	1.25E-05	1,407.92	8.45E-06	3.85E-05	800.45	4.74E-06	2.17E-05		1.27E-01		pass
Acenaphthene	7,786.84	4.83E-05	2.19E-04	6,284.14	3.77E-05	1.72E-04	6,818.25	4.03E-05	1.85E-04		1.15E-03		pass
Acenaphthylene	7,222.59	4.48E-05	2.03E-04	5,876.54	3.53E-05	1.61E-04	5,370.63	3.18E-05	1.46E-04		1.41E-02		pass
Anthracene	4,715.82	2.92E-05	1.33E-04	2,349.00	1.41E-05	6.43E-05	1,887.32	1.12E-05	5.12E-05		1.15E-03		pass
Benzo(a)anthracene	918.07	5.69E-06	2.59E-05	215.83	1.29E-06	5.90E-06	235.11	1.39E-06	6.38E-06			2.89E-04	pass
Benzo(a)pyrene	80.94	5.02E-07	2.28E-06	57.09	3.42E-07	1.56E-06	68.36	4.04E-07	1.86E-06		1.15E-03	2.41E-05	pass
Benzo(b)fluoranthene	385.72	2.39E-06	1.09E-05	72.83	4.37E-07	1.99E-06	93.93	5.56E-07	2.55E-06	8.31E-02		2.89E-04	pass
Benzo(k)fluoranthene	55.26	3.43E-07	1.56E-06	29.05	1.74E-07	7.95E-07	35.35	2.09E-07	9.59E-07			2.89E-04	pass
bis(2-Ethylhexyl)phthalate	199.71	1.24E-06	5.62E-06	28.25	1.69E-07	7.73E-07	582.34	3.45E-06	1.58E-05		1.16E-01		pass
Carbazole	470.26	2.92E-06	1.32E-05	284.26	1.71E-06	7.78E-06	141.70	8.38E-07	3.85E-06		3.22E-03		pass
Chrysene	1,045.75	6.49E-06	2.95E-05	264.23	1.58E-06	7.23E-06	332.33	1.97E-06	9.02E-06		1.15E-03		pass
Dibenzofuran	19,063.38	1.18E-04	5.37E-04	14,081.41	8.45E-05	3.85E-04	14,764.75	8.74E-05	4.01E-04				
Diethylphthalate	29.38	1.82E-07	8.27E-07	20.35	1.22E-07	5.57E-07	26.33	1.56E-07	7.15E-07		2.88E-02		pass
Fluoranthene	11,381.86	7.06E-05	3.21E-04	2,541.65	1.52E-05	6.95E-05	2,509.91	1.48E-05	6.81E-05		4.72E-02		pass
Fluorene	4,803.06	2.98E-05	1.35E-04	3,031.56	1.82E-05	8.29E-05	2,933.05	1.74E-05	7.96E-05		1.15E-03		pass
Naphthalene	259,878.10	1.61E-03	7.32E-03	472,492.20	2.83E-03	1.29E-02	315,770.80	1.87E-03	8.57E-03	3.18E-01	2.99E-01		pass
Phenanthrene	30,640.86	1.90E-04	8.63E-04	12,999.34	7.80E-05	3.56E-04	13,054.30	7.72E-05	3.54E-04		5.64E-03		pass
Phenol	1,746.48	1.08E-05	4.92E-05	2,819.09	1.69E-05	7.71E-05	1,902.49	1.13E-05	5.16E-05		1.09E-01		pass
Pyrene	5,197.03	3.22E-05	1.46E-04	1,269.18	7.61E-06	3.47E-05	1,248.89	7.39E-06	3.39E-05		1.15E-03		pass
Non-Detected SVOCs	*(Sample mass represents detection limit)*												
1,2,4-Trichlorobenzene	115.38	7.16E-07	3.25E-06	40.14	2.41E-07	1.10E-06	51.12	3.02E-07	1.39E-06		2.13E-01		pass
1,2-Dichlorobenzene	87.56	5.43E-07	2.47E-06	74.50	4.47E-07	2.04E-06	86.80	5.14E-07	2.36E-06	1.21E+00	8.63E-01		pass
1,3-Dichlorobenzene	83.78	5.20E-07	2.36E-06	71.29	4.28E-07	1.95E-06	83.06	4.91E-07	2.25E-06		4.03E-01		pass
1,4-Dichlorobenzene	79.41	4.93E-07	2.24E-06	67.57	4.05E-07	1.85E-06	78.72	4.66E-07	2.14E-06		3.45E-01	7.35E-03	pass
2,2'-oxybis(1-Chloropropane)	100.53	6.23E-07	2.83E-06	85.53	5.13E-07	2.34E-06	99.66	5.90E-07	2.71E-06				
2,4,5-Trichlorophenol	141.71	8.79E-07	3.99E-06	122.38	7.34E-07	3.35E-06	141.27	8.36E-07	3.83E-06				
2,4,6-Trichlorophenol	143.01	8.87E-07	4.03E-06	123.50	7.41E-07	3.38E-06	142.56	8.43E-07	3.87E-06				
2,4-Dichlorophenol	171.38	1.06E-06	4.83E-06	59.62	3.58E-07	1.63E-06	75.93	4.49E-07	2.06E-06				
2,4-Dinitrophenol	411.15	2.55E-06	1.16E-05	355.07	2.13E-06	9.71E-06	409.87	2.42E-06	1.11E-05				
2,4-Dinitrotoluene	152.43	9.45E-07	4.29E-06	131.64	7.90E-07	3.60E-06	151.95	8.99E-07	4.12E-06				
2,6-Dinitrotoluene	184.35	1.14E-06	5.19E-06	159.21	9.55E-07	4.35E-06	183.78	1.09E-06	4.99E-06				
2-Chloronaphthalene	55.60	3.45E-07	1.57E-06	48.02	2.88E-07	1.31E-06	55.43	3.28E-07	1.50E-06				
2-Chlorophenol	109.98	6.82E-07	3.10E-06	93.58	5.61E-07	2.56E-06	109.03	6.45E-07	2.96E-06				
2-Nitroaniline	124.74	7.74E-07	3.51E-06	107.73	6.46E-07	2.95E-06	124.35	7.36E-07	3.38E-06				
2-Nitrophenol	210.46	1.31E-06	5.93E-06	73.21	4.39E-07	2.00E-06	93.24	5.52E-07	2.53E-06				
3,3'-Dichlorobenzidine	182.75	1.13E-06	5.15E-06	146.27	8.77E-07	4.00E-06	177.37	1.05E-06	4.81E-06				
3-Nitroaniline	233.19	1.45E-06	6.57E-06	201.38	1.21E-06	5.51E-06	232.46	1.38E-06	6.31E-06				
4,6-Dinitro-2-methylphenol	438.43	2.72E-06	1.23E-05	355.67	2.13E-06	9.73E-06	419.52	2.48E-06	1.14E-05				
4-Bromophenyl-phenylether	172.86	1.07E-06	4.87E-06	140.23	8.41E-07	3.84E-06	165.40	9.79E-07	4.49E-06				

ORIGINAL (Red)

Table G-5: SVOC Summary

4-Chloro-3-methylphenol	141.43	8.77E-07	3.98E-06	49.20	2.95E-07	1.35E-06	62.66	3.71E-07	1.70E-06				
4-Chloroaniline	119.04	7.38E-07	3.35E-06	41.41	2.48E-07	1.13E-06	52.74	3.12E-07	1.43E-06				
4-Chlorophenyl-phenylether	60.56	3.76E-07	1.71E-06	52.30	3.14E-07	1.43E-06	60.37	3.57E-07	1.64E-06				
4-Nitroaniline	190.53	1.18E-06	5.37E-06	164.54	9.87E-07	4.50E-06	189.94	1.12E-06	5.16E-06				
4-Nitrophenol	158.62	9.84E-07	4.47E-06	136.98	8.22E-07	3.75E-06	158.12	9.35E-07	4.29E-06				
Benzo(g,h,i)perylene	126.98	7.88E-07	3.58E-06	108.60	6.51E-07	2.97E-06	130.04	7.69E-07	3.53E-06				
Benzyl alcohol	181.67	1.13E-06	5.12E-06	154.58	9.27E-07	4.23E-06	180.10	1.07E-06	4.89E-06				
bis(2-Chloroethoxy)methane	146.15	9.06E-07	4.12E-06	50.84	3.05E-07	1.39E-06	64.75	3.83E-07	1.76E-06				
bis(2-Chloroethyl)ether	135.47	8.40E-07	3.82E-06	115.27	6.91E-07	3.15E-06	134.30	7.95E-07	3.65E-06				
Butylbenzylphthalate	73.78	4.58E-07	2.08E-06	59.05	3.54E-07	1.62E-06	71.61	4.24E-07	1.94E-06				
Dibenzo(a,h)anthracene	114.68	7.11E-07	3.23E-06	98.08	5.88E-07	2.68E-06	117.44	6.95E-07	3.19E-06			2.89E-04	pass
Dimethylphthalate	37.83	2.35E-07	1.07E-06	32.67	1.96E-07	8.94E-07	37.71	2.23E-07	1.02E-06				
Di-n-butylphthalate	27.91	1.73E-07	7.86E-07	22.64	1.36E-07	6.19E-07	26.71	1.58E-07	7.25E-07				
Di-n-octylphthalate	31.61	1.96E-07	8.90E-07	27.03	1.62E-07	7.39E-07	32.37	1.92E-07	8.79E-07				
Hexachlorobenzene	135.85	8.43E-07	3.83E-06	110.21	6.61E-07	3.01E-06	129.99	7.69E-07	3.53E-06				
Hexachlorobutadiene	113.39	7.03E-07	3.19E-06	39.44	2.37E-07	1.08E-06	50.24	2.97E-07	1.36E-06		1.21E-03		pass
Hexachlorocyclopentadiene	76.49	4.74E-07	2.15E-06	66.06	3.96E-07	1.81E-06	76.25	4.51E-07	2.07E-06				
Hexachloroethane	126.26	7.83E-07	3.56E-06	107.43	6.44E-07	2.94E-06	125.17	7.41E-07	3.40E-06				
Indeno(1,2,3-cd)pyrene	98.05	6.08E-07	2.76E-06	83.86	5.03E-07	2.29E-06	100.42	5.94E-07	2.73E-06			2.89E-04	pass
Isophorone	58.46	3.63E-07	1.65E-06	20.34	1.22E-07	5.56E-07	25.90	1.53E-07	7.03E-07				
Nitrobenzene	100.41	6.23E-07	2.83E-06	34.93	2.10E-07	9.55E-07	44.48	2.63E-07	1.21E-06		2.88E-02		pass
N-Nitroso-di-n-propylamine	141.55	8.78E-07	3.99E-06	120.44	7.22E-07	3.29E-06	140.33	8.30E-07	3.81E-06				
N-Nitrosodiphenylamine	101.53	6.30E-07	2.86E-06	82.37	4.94E-07	2.25E-06	97.15	5.75E-07	2.64E-06				
Pentachlorophenol	305.23	1.89E-06	8.60E-06	247.62	1.49E-06	6.77E-06	292.07	1.73E-06	7.93E-06		2.88E-03		pass
Total SVOC	396,532.20	2.46E-03	1.12E-02	553,445.06	3.32E-03	1.51E-02	393,807.85	2.33E-03	1.07E-02				

ORIGINAL (Red)

Table G-6

Dioxin Summary

Analyte	Continuous POP #2			Continuous POP #2			Continuous POP #2		
	Sample Volume (DSCF) :		161.236	Sample Volume (DSCF) :		166.708	Sample Volume (DSCF) :		169.030
	Stack Volumetric Flow Rate (DSCFM) :		272	Stack Volumetric Flow Rate (DSCFM) :		274	Stack Volumetric Flow Rate (DSCFM) :		275
	Sample Mass (nanogram)	**Sample Conc. (g/DSCF)**	**Stack Mass Flow Rate (g/s)**	**Sample Mass (nanogram)**	**Sample Conc. (g/DSCF)**	**Stack Mass Flow Rate (g/s)**	**Sample Mass (nanogram)**	**Sample Conc. (g/DSCF)**	**Stack Mass Flow Rate (g/s)**
2,3,7,8-TCDF	0.16	9.92E-13	4.51E-12	0.14	8.40E-13	3.83E-12	0.07	4.14E-13	1.90E-12
2,3,7,8-TCDD	2.5	1.55E-11	7.04E-11	1.2	7.20E-12	3.28E-11	0.92	5.44E-12	2.50E-11
1,2,3,7,8-PeCDD	6.4	3.97E-11	1.80E-10	3.1	1.86E-11	8.48E-11	2.3	1.36E-11	6.24E-11
1,2,3,4,7,8-HxCDD	5.7	3.54E-11	1.61E-10	2.7	1.62E-11	7.39E-11	1.9	1.12E-11	5.16E-11
1,2,3,6,7,8-HxCDD	6.7	4.16E-11	1.89E-10	3.2	1.92E-11	8.75E-11	2.2	1.30E-11	5.97E-11
1,2,3,7,8,9-HxCDD	15.3	9.49E-11	4.31E-10	11.6	6.96E-11	3.17E-10	7	4.14E-11	1.90E-10
1,2,3,4,6,7,8-HpCDD	49.1	3.05E-10	1.38E-09	27.3	1.64E-10	7.47E-10	17.6	1.04E-10	4.78E-10
1,2,3,4,6,7,8,9-OCDD	75.9	4.71E-10	2.14E-09	48.8	2.93E-10	1.33E-09	29.1	1.72E-10	7.90E-10
1,2,3,7,8-PeCDF	0.53	3.29E-12	1.49E-11	0.26	1.56E-12	7.11E-12	0.16	9.47E-13	4.34E-12
2,3,4,7,8-PeCDF	0.67	4.16E-12	1.89E-11	0.28	1.68E-12	7.66E-12	0.18	1.06E-12	4.89E-12
1,2,3,4,7,8-HxCDF	1	6.20E-12	2.82E-11	0.59	3.54E-12	1.61E-11	0.31	1.83E-12	8.41E-12
1,2,3,6,7,8-HxCDF	0.61	3.78E-12	1.72E-11	0.34	2.04E-12	9.30E-12	0.19	1.12E-12	5.16E-12
2,3,4,6,7,8-HxCDF	0.56	3.47E-12	1.58E-11	0.39	2.34E-12	1.07E-11	0.24	1.42E-12	6.51E-12
1,2,3,7,8,9-HxCDF	0.03	1.86E-13	8.45E-13	0.06	3.60E-13	1.64E-12	0.03	1.77E-13	8.14E-13
1,2,3,4,6,7,8-HpCDF	2.9	1.80E-11	8.17E-11	1.4	8.40E-12	3.83E-11	0.82	4.85E-12	2.23E-11
1,2,3,4,7,8,9-HpCDF	0.56	3.47E-12	1.58E-11	0.34	2.04E-12	9.30E-12	0.25	1.48E-12	6.79E-12
1,2,3,4,6,7,8,9-OCDF	4.4	2.73E-11	1.24E-10	0.35	2.10E-12	9.57E-12	0.1	5.92E-13	2.71E-12
Total Dioxin	173.02	1.07E-09	4.87E-09	102.05	6.12E-10	2.79E-09	63.37	3.75E-10	1.72E-09
Total Dioxin TEF *	11.70	7.26E-11	1.95E-10	6.97	4.18E-11	1.16E-10	4.35	2.58E-11	7.26E-11

* Dioxin Toxicity Equivalents Factor by I-TEF/89 scheme gives toxicity equivalence to 2,3,7,8-TCDD.

Total TCDD	469	2.91E-09	1.32E-08	54	3.24E-10	1.48E-09	37	2.19E-10	1.00E-09
Total PeCDD	120	7.44E-10	3.38E-09	73.6	4.41E-10	2.01E-09	44.7	2.64E-10	1.21E-09
Total HxCDD	152	9.43E-10	4.28E-09	85.1	5.10E-10	2.33E-09	47.1	2.79E-10	1.28E-09
Total HpCDD	132	8.19E-10	3.72E-09	66.7	4.00E-10	1.82E-09	40.5	2.40E-10	1.10E-09
Total TCDF	24.8	1.54E-10	6.98E-10	4.9	2.94E-11	1.34E-10	3.8	2.25E-11	1.03E-10
Total PeCDF	15.1	9.37E-11	4.25E-10	5	3.00E-11	1.37E-10	3	1.77E-11	8.14E-11
Total HxCDF	11.7	7.26E-11	3.29E-10	6.7	4.02E-11	1.83E-10	3.5	2.07E-11	9.50E-11
Total HpCDF	8.6	5.33E-11	2.42E-10	4.8	2.88E-11	1.31E-10	2.6	1.54E-11	7.06E-11
Total TCDF	24.8	1.54E-10	6.98E-10	4.9	2.94E-11	1.34E-10	3.8	2.25E-11	1.03E-10
Total PeCDF	15.1	9.37E-11	4.25E-10	5	3.00E-11	1.37E-10	3	1.77E-11	8.14E-11
Total HxCDF	11.7	7.26E-11	3.29E-10	6.7	4.02E-11	1.83E-10	3.5	2.07E-11	9.50E-11
Total HpCDF	8.6	5.33E-11	2.42E-10	4.8	2.88E-11	1.31E-10	2.6	1.54E-11	7.06E-11

ORIGINAL (Red)

Table G-6 (cont'd.)

Dioxin Summary

Analyte	Scenario 3 Maximum Allowable Mass Emission Rate (1-hr) (g/s)	(8-hr) (g/s)	(annual) (g/s)	Pass/Fail Outlet
2,3,7,8-TCDF	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA
1,2,3,4,6,7,8,9-OCDD	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA
1,2,3,4,6,7,8,9-OCDF	NA	NA	NA	NA
Total Dioxin	NA	NA	NA	NA
Total Dioxin TEF *		1.15E-07	1.51E-09	pass

* Dioxin Toxicity Equivalents F

Total TCDD	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA

Dioxin/Furan Toxicity Equivalency Factors
I-TEFs/89 Scheme

ORIGINAL (Red)

Compound	I-TEFs/89
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	0.5
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
1,2,3,4,6,7,8,9-OCDD	0.001
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
1,2,3,4,6,7,8,9-OCDF	0.001

ORIGINAL (Red)

Weather Station Data

Date	Time	Rainfall (reset daily)	Humidity	Temperature (outside)	Barometer	Wind Speed	Wind Direction
4/11/99	840	0.02	87	50	30.02	2	170
4/11/99	1020	0.04	81	52	29.98	2	130
4/11/99	1410	0.14	83	51	29.87	4	130
4/11/99	1700	0.16	90	50	29.76	4	130
4/11/99	1930	0.19	93	51	29.75	2	90
4/11/99	2200	0.20	95	49	29.74	4	60
4/12/99	130	0.00	99	48	29.78	6	330
4/12/99	530	0.00	93	43	29.78	4	230
4/12/99	850	0.00	93	51	29.87	7	260
4/12/99	1110	0.00	60	56	29.88	10	330
4/12/99	1530	0.00	53	56	29.90	6	340
4/12/99	2000	0.00	53	53	29.90	4	330
4/12/99	2300	0.00	50	51	29.89	6	300
4/13/99	100	0.00	49	47	29.91	3	200
4/13/99	400	0.00	47	46	29.91	2	270
4/13/99	800	0.00	46	47	30.00	4	290
4/13/99	1100	0.00	31	57	29.94	4	280
4/13/99	200	0.00	23	64	29.93	14	270
4/13/99	2000	0.00	24	59	29.92	7	320
4/13/99	2300	0.00	29	56	29.91	4	320
4/14/99	200	0.00	30	52	29.89	2	330
4/14/99	600	0.00	37	46	29.87	4	270
4/14/99	1100	0.00	24	60	30.00	6	330
4/14/99	1300	0.00	21	69	29.97	16	290
4/14/99	1800	0.00	17	73	29.96	6	290
4/14/99	2000	0.00	22	65	29.99	6	270
4/14/99	2335	0.00	32	56	29.95	2	230
4/15/99	230	0.00	58	46	29.89	1	230
4/15/99	420	0.00	67	43	29.85	0	160
4/15/99	855	0.00	47	55	29.91	1	170
4/15/99	1047	0.00	45	60	29.99	4	180
4/15/99	1620	0.01	60	56	29.98	2	120
4/15/99	2010	0.04	77	52	29.70	7	70
4/15/99	2122	0.04	81	51	29.67	4	90

ORIGINAL (Red)

Appendix J
Risk Based Concentration for Ambient Air: Resident Child

CHEMICAL	CSFi (kg x day/mg)	RfDi (mg/kg/day)	Adjusted RBC carcinogenic ($\mu g/m^3$)	Adjusted RBC non-carcinogenic ($\mu g/m^3$)
benzo(a)pyrene	3.1	not applicable	**0.01**	not applicable
pentachlorophenol	1.2E-01	3E-02	**0.38**	39.11
benzene	2.9E-02	1.7E-03	**1.57**	2.23
methylene chloride	1.65E-03	8.60E-01	**27.65**	1,121.07
toluene	N/A	1.14E-01	---	**148.61**

Adjusted RBC Carcinogenic = (TR x BW x ATc x 1000 ug/mg)(IR x EF x ED x CSFi)
Adjusted RBC Non-Carcinogenic = (THQ X RfDi X BW x Atn x 1000 ug/mg)(IR x EF X ED)

where:	
TR = target risk (unitless)	1E-06
THQ = target hazard quotient	1.0
BW = body weight (kg)	15
ATc = carcinogenic averaging time	25550
Atn = non-carcinogenic averaging time (days)	730
IR = inhalation rate (m3/day)	12
EF = exposure frequency (days/year)	350
ED = exposure duration (years)	2
CSFi = Inhalation carcinogenic slope factor (kg x day/mg)	chemical-specific
RfDi = inhalation reference dose (mg/kg/day)	chemical specific

Note: For benzo(a)pyrene and benzene, toxicity criteria - CSFi and RfDi, respectively - were not available in EPA's Integrated Risk Information System (IRIS). However, USEPA, National Center for Environmental Assessment (NCEA) has developed provisional values, which are provided in this table and considered in these calculations.

Inhalation toxicity criteria are not available for pentachlorophenol. Instead, for the sake of calculations, oral criteria are applied.

Bold print in the table denotes the most stringent RBC value (carcinogenic vs. non-carcinogenic) for a given chemical. The respective values highlighted by bold print could represent ambient air action levels during remediation. All of the selected RBC values are for carcinogenic endpoints, and protect at a level of 1E-06 which is the most stringent end of USEPA's acceptable risk range.

For non-carcinogenics, RBCs represent a hazard quotient of 1.

ORIGINAL (Red)

Air Conversion

It is common practice to express the quantity of a gaseous pollutant present in the air as parts per million (ppm). Thus

$$\frac{1 \text{ volume of gaseous pollutant}}{10^{3} \text{ volumes (pollutant + air)}} = 1 \text{ ppm}$$

$$0.01 \quad \text{percent by volume} = 1 \text{ ppm}$$

The mass of a pollutant is expressed as micrograms of pollutant per cubic meter of air. Symbolically,

$$\frac{\text{micrograms}}{\text{cubic meter}} = \mu g/m^3$$

At 25°C and 101.3 kPa (1atm) pressure the relationship between parts per million and micrograms per cubic meter is found from

$$\frac{m_{pol}}{V_{air}} = \frac{P_{pol}V_{pol}}{V_{air}} \frac{PM_{pol}}{P_{pol}R_uT} = \frac{V_{pol}}{V_{air}} \frac{PM_{pol}}{R_uT}$$

where the pollutant gas is assumed to be an ideal gas, and M_{pol} is the molar mass of the pollutant. If P is taken as 1 atm, T as 298°K, and R_u as 0.08208 atm • m^3/kg mol • °K, then the equation reduces to

$$\frac{m_{pol}}{V_{air}} = \frac{V_{pol}}{V_{air}} \frac{M_{pol}}{24.5}$$

where the mass of pollutant per unit volume is now expressed ad kg/m^3. Finally, by multiplying the right side by 10^9 to convert the mass to micrograms, and by dividing by 10^8 so that V_{pol}/V_{air} can be expressed as parts per million, then the basic relation between ug/m^3 and ppm at 1 atm and 25°C is

$$\mu g/m^3 = \frac{\text{ppm x molecular weight } (10^3)}{24.5}$$

For conditions of 1 atm and 0° C (273° K) the constant in the denominator becomes 22.41. Sometimes concentrations are also expressed in parts per billion (ppb) or parts per hundred million (pphm).

The following examples illustrate the calculations required for converting from one system of units to another.

ORIGINAL (Red)

Calculation of 95% Upper Confidence Limit for Concentration of Benzo(a)pyrene in Soil

The following steps, which are in accordance with USEPA (1989) guidance, were used to calculate the 95% UCL concentration of benzo(a)pyrene in soil in the containment area (Pit #4).

Step 1: Obtain input data. Analytical soil data from the containment area was obtained from the Remedial Investigation/Feasibility Study Report for the SMWT Site prepared by CDM in May 1988 (p. F-38) and from the Hazardous Waste Remedial Action Predesign Report prepared by Dames & Moore in June 1992 (Table D-2). The data used is summarized in the following table.

Sample	B(a)P in ug/kg	Sample	B(a)P in ug/kg	Sample	B(a)P in ug/kg
MW9	38	SB9 20-22'	150U	SB11 10-12'	5,800
MW16	30,000	SB925-27'	190U	SB11 12-14'	3,400
MW28 0-2'	32,000	SB9 30-32'	170U	SB12 2-4'	1,000
MW28 10-12'	170U	SB9 35-37'	170U	SB1210-12'	4,200U
MW28 14-18'	140,000	SB9 40-42'	210U	SO23 0-1.5'	160U
SB8 0-2'	160U	SB10 0-2'	160U	SO23 1.5-3'	160U
SB8 5-7'	150U	SB10 5-7'	170U	SO23 3-4.5'	160U
SB8 10-12'	160U	SB10 10-12'	150U	SO24 0-1.5'	810U
SB815-17'	170U	SB10 15-17'	150U	SO24 1.5-3'	160U
SB8 18-20'	150U	SB10 20-22'	150U	SO24 3-4.5'	160U
SB9 0-2'	150U	SB10 25-27'	170U	SO25 0-1.5'	160U
SB9 5-7'	170U	SB10 30-32'	170U	SO25 1.5-3'	160U
SB9 10-12'	250	SB10 35-37'	170U	SO25 3-4.5'	160U
SB9 15-17'	150U	SB11 0-2'	150U		

Step 2: Determine appropriate equation. The distribution data set was tested for distribution using the Shapiro-Wilks test of normality (Gilbert, 1987), and the data were determined to be lognormally distributed. Therefore, the equation used for calculating the UCL, discussed by Gilbert (1987) and Land (1975) and presented in USEPA (1992), is:

$$UCL_{0.95} = \exp\left(y + 0.5(s_y)^2 + (s_y \times H_{0.95})/(n-1)^{1/2}\right)$$

where:

- UCL = upper confidence limit;
- y = mean of the logtransformed data;
- s_y = standard deviation of the logtransformed data;
- $(s_y)^2$ = variance of the logtransformed data;
- H = H-statistic (i.e., from Gilbert 1987, p. 265); and
- n = number of samples in population.

ORIGINAL
(Red)

Step 3: Calculation of the mean of the logtransformed data. A "U" qualifier (indicating the compound had not been detected at or above the given detection limit) was present in the data set. Values with this qualifier were divided in half before being logtransformed. One-half the detection limit is typically used in risk assessments (USEPA 1989) when averaging non-detect concentrations, because the actual value can be between zero and a value just below the detection limit. All data were then logtransfromed by taking the natural log of each value. Mean chemical concentrations were calculated by averaging the logtransformed data. Standard deviation and variance were also calculated from this data.

Step 4: Calculation of the 95% UCL: Using the standard deviation and the number of samples (41), the H-statistic was determined. Plugging all these values into the equation in Step 2, the 95% UCL concentration of benzo(a)pyrene in soil in the containment area was calculated to be 3,640 µg/kg.

GILBERT, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York

LAND, C.E. 1975. Tables of confidence limits for linear functions of the normal mean and variance. Math. Stat. 3:385-419

U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA). 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part A. Interim Final. EPA/540/1-89/002. December 1989

U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA). 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Solid Waste and Emergency Response, Washington, D.C. PB92-963373. May 1992

Inorganic EPA Defined Result Qualifiers

ORIGINAL (Red)

C (Concentration) Qualifier:

B Used if the reported value was obtained from a reading that was less than the contract Required Detection Limit (CRDL) but greater than or equal to the MDL.

U Used if the reported value was obtained from a reading that was less than the MDL.

Q (Quality Control) Qualifier:

E The reported value is estimated because of the presence of interference.

I The sum of the values of the interference correction(s) is greater than the result concentration.

M Duplicate injection/exposure precision not met.

N Spiked sample recovery not within control limits.

S The reported value was determined by the Method of Standard Additions (MSA).

***** Duplicate analysis not within control limits

+ Correlation coefficient for the MSA is less than 0.995.

Note: Entering "S" or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

M (Method) Qualifier:

P	ICP
H	HYICP
F	Graphite Furnace AA
CV	Manual Cold Vapor AA
AV	Automated Cold Vapor AA
AS	Seim-automated Spectrophotometric
C	Manual Spectrophotometric
NR	If the analyte is not required to be analyzed.

Organic EPA Defined Result Qualifiers

ORIGINAL (Red)

U Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. For example, 10 U for phenol in water if the sample final volume is the protocol-specified final volume. If a 1 to 10 dilution of extract is necessary, the reported limit is 100 U. For a soil sample, the value must also be adjusted for percent moisture. For example, if the sample had 24% moisture and a 1 to 10 dilution factor, the sample quantitation limit for phenol (330 U) would be corrected to:

$$\frac{(330\ U)}{D} \times df \qquad \text{where } D = \frac{100 - \%\ \text{moisture}}{100}$$

and df = dilution factor

For example, at 24% moisture, $D = \frac{100 - 24}{100} = 0.76$

$$\frac{(330\ U)}{0.76} \times 10 = 4300\ U$$ rounded to the appropriate number of significant figure

For semivolatile soil samples, the extract must be concentrated to 0.5 mL, and the sensitivity of the analysis is not compromised by the cleanup procedures. Similarly, pesticide samples subjected to GPC are concentrated to 5.0 mL. Therefore, the CRQL values in Exhibit C will apply to all samples, regardless of cleanup. However, if a sample extract cannot be concentrated to the protocol-specified volume (see Exhibit C, 3/90 SOW), this fact must be accounted for in reporting the sample quantitation limit.

J Indicates an estimated value. This flag is used under the following circumstances:
1) when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed,
2) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the CRQL but greater than zero,
3) when the retention time data indicate the presence of a compound that meets the pesticide/Aroclor identification criteria and the result is less than the CRQL but greater than zero.
Note: The "J" code is not used and the compound is not reported as being identified for pesticide/Aroclor results less than the CRQL, if the technical judgement of the pesticide residue analysis expert determines that the peaks used for compound identification resulted from instrument noise or other interferences (column bleed, solvent contamination, etc.). For example, if the sample quantitation limit is 10 μg/L, but a concentration of 3 μg/L is calculated, report it as 3J. The sample quantitation limit must be adjusted for dilution as discussed for the U flag.

ORIGINAL (Red)

N Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds, where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N code is not used.

P This flag is used for a pesticide/Aroclor target analyte when there is greater than 25% difference for detected concentrations between the two GC columns (see Form X). The lower of the two values is reported on Form I and flagged with a "P".

C This flag applies to pesticide results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, do not apply this flag, instead use a laboratory-defined flag, discussed below.

B This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. This flag must be used for a TIC as well as for a positively identified target compound.

E This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis. If one or more compounds have a response greater than full scale, except as noted in Exhibit D of the 3/90 SOW, the sample or extract must be diluted and re-analyzed according to the specifications in Exhibit D of the 3/90 SOW. All such compounds with a response greater than full scale should have the concentration flagged with an "E" on the Form I for the original analysis. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses shall be reported on separate copies of Form I. The Form I for the diluted sample shall have the "DL" suffix appended to the sample number. **Note:** For total xylenes, where three isomers are quantified as two peaks, the calibration range of each peak should be *considered separately, e.g., a diluted analysis is not required for total xylenes* unless the concentration of the peak representing the single isomer exceeds 200 μg/L or the peak representing the two coeluting isomers on that GC column exceeds 400 μg/L. Similarly, if the two 1,2-Dichloroethene isomers coelute, a diluted analysis is not required unless the concentration exceeds 400 μg/L.

D This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag. This flag alerts data users that any discrepancies between the concentrations reported may be due to dilution of the sample or extract.

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ORIGINAL (Red)

A This flag indicates that a TIC is a suspected aldol-condensation product.

X Other specific flags may be required to properly define the results. If used, they must be dully described, and such description attached to the Sample Data Summary Package and the SDG Narrative. Begin by using "X". If more than one flag is required, use "Y" and "Z" as needed. If more than five qualifiers are required for a sample result, use the "X" flag to combine several flags, as needed. For instance, the "X" flag might combine the "A", "B", and "D" flags for some samples. The laboratory-defined flags are limited to the letters "X", "Y", and "Z".

The combination of flags "BU" or "UB" is expressly prohibited. Blank contaminants are flagged "B" only when they are detected in the sample.

ORIGINAL (Red)

SOP Classification Series

SOP SERIES	TITLE
10.0	**DOCUMENTATION**
10.1	Field Logbook
10.2	Chain-of-Custody Forms
30.0	**SAMPLING**
30.3	Percent Moisture Soil Sampling
30.5	Particulate Monitoring Using Miniram
30.6	Collection of Ambient Air with Summa Steel Canisters
30.7	Thermal Desorption Unit Soil Sampling
30.8	Water Sampling during the TDU Proof of Performance
30.9	Sampling for the Water Treatment Plant
30.10A	TDU Stack Sampling Protocol
50.0	**SAMPLE MANAGEMENT**
50.1	Sample Labels
50.2	Sample Packaging
50.3	Sample Preservation and Container Requirements

STANDARD OPERATING PROCEDURE 10.1
FIELD LOGBOOK

ORIGINAL (Red)

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to delineate protocols for recording daily site investigation activities.

Records should contain sufficient information so that anyone can reconstruct the sampling activity without relying on the collector's memory.

2.0 MATERIALS

- Field Logbook
- Indelible ink pen

3.0 PROCEDURE

Information pertinent to site investigations will be recorded in a bound logbook. Each page/form will be consecutively numbered, dated, and signed. All entries will be made in indelible ink and all corrections will consist of line-out deletions that are initialed and dated. If only part of a page is used, the remainder of the page should have an "X" drawn across it. At a minimum, entries in the logbook will include but not be limited to the following:

- A general description of the field activity.
- Project number.
- Name and affiliation of personnel on site.
- Unique, sequential field sample number.
- Location, description, and each sampling point.
- Details of the sample site.
- Name and address of field contact.
- Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample.
- Identification of sample crew members.
- Weather conditions.
- Sample matrix (for example, groundwater or surface water).
- Sample number and volume.
- Analytical request.
- Sampling methodology.
- Sample preservation.
- Date and time of collection.
- Associated QA/QC samples.
- Sample shipment.
- Field observations.
- Field measurements.
- Signature and date by the personnel responsible for observations.

4.0 MAINTENANCE

Not applicable.

5.0 PRECAUTIONS

None.

6.0 REFERENCES

USEPA. 1990. *Sampler's Guide to the Contract Laboratory Program.* EPA/540/P-90/006, Directive 9240.0-06, Office of Emergency and Remedial Response, Washington, D.C., December 1990.

USEPA. 1991. *User's Guide to the Contract Laboratory Program.* EPA/540/O-91/002, Directive 9240.0-01D, Office of Emergency and Remedial Response, January 1991.

USEPA. 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans.* QAMS-005/80.

STANDARD OPERATING PROCEDURE 10.2
CHAIN-OF-CUSTODY FORM

ORIGINAL (Red)

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to delineate protocols for use of the chain-of-custody form. An example is provided as part of this SOP. Other formats with similar levels of detail are acceptable.

2.0 MATERIALS

- Chain-of-custody form
- Indelible ink pen

3.0 PROCEDURE

1. Give the site name and project name/number.
2. Enter the sample identification code.
3. Indicate the sampling dates for all samples.
4. List the sampling times (military format) for all samples.
5. Indicate "grab" or "composite" sample with an "X."
6. Specify the sample location.
7. Enter the total number of containers per cooler.
8. List the analyses/container volume.
9. State the carrier service and airbill number, analytical laboratory, and custody seal numbers.
10. Sign, date, and time the "relinquished by" section.
11. Upon completion of the form, retain the shipper copy, and place the forms and the other copies in a zip seal bag to protect from moisture. Affix the zip seal bag to the inside of the sample cooler to be sent to the designated laboratory.

4.0 MAINTENANCE

Not applicable.

5.0 PRECAUTIONS

None.

6.0 REFERENCES

USEPA. 1990. *Sampler's Guide to the Contract Laboratory Program.* EPA/540/P-90/006, Directive 9240.0-06, Office of Emergency and Remedial Response, Washington, D.C., December 1990.

USEPA. 1991. *User's Guide to the Contract Laboratory Program..* EPA/540/O-91/002, Directive 9240.0-01D, Office of Emergency and Remedial Response, January 1991.

USEPA. 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* QAMS-005/80.

ORIGINAL (Red)

STANDARD OPERATING PROCEDURE 30.3
PERCENT MOISTURE SOIL SAMPLING

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define procedures for collecting percent moisture soil samples. Prior to full scale operations, a statistical method will be used to determine the variation in measured moisture content within a grab sample set. This will provide an indication of the accuracy and precision with which a single grab sample can characterize the moisture content of feed soils. Samples will be collected for grain size analysis to determine if there is a correlation between grain size and percent moisture.

2.0 MATERIALS

- Certified clean sample containers
- Stainless steel hand trowel
- Field logbook
- Chemical resistant gloves

3.0 PROCEDURES

Statistical Testing

A 3' x 3' x 3' pile of site representative soil will be stockpiled. The samples shall contain no obvious heterogeneities. Twelve samples will be collected from the pile for percent moisture and grain size analyses.

1. A grab sample will be collected using a disposable or stainless steel trowel.
2. The sample will be placed directly into the appropriate size sample jar.
3. Samples will be taken from the pile at twelve random locations (The same locations will be used to collect both % moisture and grain size samples).
4. Samples will be analyzed on-site for percent moisture and grain size.

Full Scale Operations

One grab sample will be collected and analyzed for percent moisture from the feed soil piles for the batch and continuous units each day following the procedures 1, 2 and 4 above.

4.0 MAINTENANCE

Not Applicable

5.0 PRECAUTIONS

1. Avoid dermal contact with soil.
2. Remove organic material, rocks, or pebbles

6.0 REFERENCES

USACE. 1998. Sampling and Analysis Plan for Remedial Activities for Southern Maryland Wood Treatment Site. Draft Final.

USACE. 1998. Quality Assurance Plan for Remedial Activities for Southern Maryland Wood Treatment Site. Draft Final.

ORIGINAL (Red)

STANDARD OPERATING PROCEDURE 30.5
PARTICULATE MONITORING USING DUST MONITOR

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define procedures for particulate monitoring. Semi-volatile organic compounds (SVOCs) will be indirectly measured with a dust monitor using the assumption that all dust captured in the monitoring device contains 3.640 μg B(a)P/kg dust (the calculated 95% upper confidence limit concentration of B(a)P soil from the containment area). Dividing this by the limit gives an action level of 2,750 ug/kg dust.

2.0 MATERIALS

- Dust Monitor
- Field logbook
- Calibration logbook

3.0 PROCEDURE

1. Dust monitor will be calibrated following manufacturer's instructions.
2. Sixteen potential sampling points, relatively equidistant along the perimeter will be identified prior to monitoring activities. This way, all potential wind directions will be represented. These locations will be chosen to obtain the most favorable areas (height, access, etc.) depending on the wind direction(s) on any given day.
3. Prior to daily sampling, a meteorological survey will be used to design the air-monitoring network so that it takes into account local wind patterns. This may be obtained from an on-site weather station and wind socks, weather radio or local airport and will include wind direction (if not steady, a range of directions), wind speed and humidity.
4. After wind direction is determined, three sample points downwind and one sample point upwind will be determined to best represent air concentrations. Downwind points do not have to be in series, if wind directions would be better represented by non-sequential points.
5. Readings will be taken directly from the readout screen three times a day (approximately zero, four and eight hours after set-up or as conditions warrant). Time, location (with rationale) and reading will be recorded in the logbook.
6. At the end of the day, the Shift-Average button will be pressed and the reading recorded.

4.0 PRECAUTIONS

- Monitor wind directions frequently to note any directional change.

5.0 REFERENCES

USACE. 1998. Quality Assurance Project Plan for Remedial Activities for Southern Maryland Wood Treatment Site. Draft Final.

USACE. 1998. Sampling and Analysis Plan for Remedial Activities for Southern Maryland Wood Treatment Site. Draft Final.

ORIGINAL (Red)

STANDARD OPERATING PROCEDURE 30.6
COLLECTION OF AMBIENT AIR WITH SUMMA STEEL CANISTERS

1.0 SCOPE AND APPLICATION

This purpose of this Standard Operating Procedure (SOP) is to establish the procedure for collecting ambient air samples with summa stainless-steel canisters.

Volatile organic compounds (VOCs) in ambient air are collected as whole air samples in passivated summa stainless-steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by a mass-selective detector. This SOP describes procedures for sampling with canisters at final pressures both above atmospheric pressure (referred to as pressurized sampling) and below atmospheric pressure (referred to as subatmospheric pressure sampling).

Numerous VOCs are amenable to collection and analysis using summa canisters. A list of these analytes is available from USEPA Method TO14. Compounds may be added to the list if the compound has been performance demonstrated using ICF KE SOPs H.2 *Collection of Ambient Air With Summa Canisters* and H.1 *Analysis of Ambient Air collected with Adsorbent Cartridges and/or Summa Canisters*.

This SOP is based on the technical requirements described in the NJDEP guidance document "Field Sampling Procedures Manual (May 1992)" and the New Jersey "Technical Requirements for Site Remediation (N.J.A.C. 7:26E, May 1997)". Use of this SOP will provide Level III analytical data for site characterizations and Level IV analytical data for risk assessments. This SOP can also provide data for evaluation of remediation alternatives, engineering design of remediation activities, and support during implementation of remediation activities.

2.0 MATERIALS

2.1 SUBATMOSPHERIC PRESSURE SAMPLING

a. VOC canister sampler: Whole air sampler capable of filling an initially evacuated canister by action of flow control from near 30 inches of mercury (Hg) vacuum to near atmospheric pressure.

2.2 PRESSURIZED SAMPLING

a. VOC canister sampler: Whole air sampler capable of filling an initially evacuated canister by action of the flow controller and pump from near 30 inches Hg vacuum to 15-20 psig atmospheric pressure.

2.3 BOTH SAMPLING METHODS

a. Sampling inlet line: Stainless-steel, teflon, or tygon tubing to connect the sampler to the sample inlet.

b. Sample canister: Leak-free stainless-steel pressure vessels of desired volume with valve and summa passivated interior surfaces.

c. Breathing Zone Stand: Capable of supporting a particulate matter filter at a height of approximately 5 feet.

d. Flow meter: A rotameter or other flow rate metering device capable of quantifying flow rates of 1 to 200 cm3/min.

e. Particulate matter filter: A 2-1m sintered stainless steel in-line filter.

f. Tubing and fittings for interconnections: Tubing and fittings should be composed of tygon, teflon, or stainless-steel.

g. Fixed orifice, capillary, or adjustable micrometering valve: used in lieu of the electronic flow controller/ sample pump for grab samples or short duration time integrated samples.

h. Stop Watch: Capable of measuring to the nearest second.

i. Thermometer: Capable of measuring to the nearest 0.10C.

j. Crescent Wrenches: Sufficient to adjust fittings and interconnections.

k. Tube Cutter: Capable of cutting all tubing to be used.

l. Small Slotted Screwdriver: Of sufficient size to adjust flow restrictive and metering devices.

m. Photoionization Detector (PID)

n. Combustible Gas Indicator (CGI)

o. Field logbook

3.0 PROCEDURE

Prior to sample collection, record the following information in the field logbook.

a. Name and title of author, date and time of entry, and physical/environmental conditions during the activity.

b. Purpose of the field activity.

c. Location of the sampling activity.

d. Name and title of the field crew.

e. Level of personal safety protection used for the field activity.

f. Name and title of any visitors to the site.

g. Sample collection method.

h. Number and volume of sample(s) collected.

i. Date and time of collection.

j. Sample identification number(s).

k. Summa canister lab ID number.

l. Field measurements, including temperature, barometric pressure, cloud cover, wind speed/ direction, PID reading, and CGI reading.

m. Summary of procedure for sample collection, documentation of SOP deviations, and scope of work changes.

n. Description of any photographs taken, including film roll number.

o. All entries shall be signed at the end of the day.

Make and attach a label to the summa canister recording the following information:

a. Name and title of author.

b. Sample collection method.

c. Date and time of collection.

d. Sample identification number(s).

e. Summa canister lab ID number.

3.1 Subatmospheric Pressure Sampling

Secure sample inlet tube to the breathing zone stand and extend to approximately 5 feet. If necessary, attach air filter to the sample inlet tube to prevent dust from entering the sampling system.

Attach the sample inlet tube to the canister and tighten the valve.

Open a canister, which is evacuated to 28-30 inches Hg at sea level and fitted with a flow restricting device, to the atmosphere containing the VOCs to be sampled. The pressure differential causes the sample to flow into the canister.

This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12 to 24 hours). Sampling duration depends on the degree to which the flow is restricted. The flow will remain constant until the vacuum reads approximately 11 inches Hg. When this occurs, control the flow either manually or automatically to achieve constant flow.

When sample collection is complete, move the sample canister control valve to the closed position.

3.2 PRESSURIZED SAMPLING

Use a digital time-programmer to pre-select sample duration, and pump start and stop times.

Secure sample inlet tube to the breathing zone stand and extend to approximately 5 feet. If necessary, attach air filter to the sample inlet tube to prevent dust from entering the sampling system.

Attach the sample inlet tube to the canister and tighten the valve.

Open a canister which is evacuated to 28-30 inches Hg at sea level and connected in line with the sampler to the atmosphere containing the VOCs to be sampled.

Using a sample pump in conjunction with a flow controller, a volume of air sample is collected from the inlet tube. The initially evacuated canister is filled by action of the flow controlled pump to a positive pressure not to exceed 25 psig.

When sample collection is complete, move the sample canister control valve to the closed position.

3.3 SAMPLE PRESERVATION

Samples collected in canisters should be sent to the analytical laboratory with the canister valve closed and the sampling port capped. Samples must be accompanied by a chain-of-custody (COC) indicating sampling locations, sample numbers, date collected, sample matrix, and sample volumes. The COC should agree with the information on the summa canister label, and discrepancies must be noted on the COC at the time of receipt by the laboratory. In addition, any obvious physical damage or contamination (e.g., punctures) must also be recorded on the COC.

3.4 SAMPLE HANDLING AND STORAGE

Summa canister samples do not need any refrigeration or special handling until they are analyzed. USEPA Method TO14 does not specify a holding time for summa canister samples.

3.5 CALCULATIONS

A flow control device maintains a constant flow into the canister over the desired sample period. This flow rate is determined so that the canister is filled over the desired sampling period to 2-5 inches Hg vacuum for subatmospheric pressure sampling, or to about one atmosphere (15 psi) above ambient pressure for pressurized sampling.

3.5.1 Subatmospheric Pressure Sampling

For subatmospheric sampling, the volume of the sample must be calculated before the flow rate can be determined. The sample volume can be calculated by:

$$S = V - \left(\frac{V * E}{I}\right) \quad 1$$

Where:
S = sample volume (cm^3)
V = volume of the canister (cm^3)
I = initial canister vacuum (in. Hg)
E = estimated final vacuum (in. Hg)

For example, to calculate the sample volume of a 6-L canister with an initial canister vacuum of 28 inches Hg and an estimated final vacuum of 5 inches Hg.

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$$S = 6{,}000 - \left(\frac{6{,}000 * 5}{28}\right) \qquad 2$$

S = 4,929 cm^3

The flow rate can be calculated by:

$$F = \left(\frac{S}{T * 60}\right) \qquad 3$$

Where:

F = flow rate (cm^3/min or Ml/min)

S = sample volume (cm^3)

T = sample period (hours)

Using a 24-hour sampling period for the above sample volume, the flow rate can be calculated by:

$$F = \left(\frac{4{,}929}{24 * 60}\right) \qquad 4$$

F = 3.42 cm^3/min.

3.5.2 Pressurized Sampling

For pressurized sampling, only the flow rate has to be calculated. For example, if a 6-L canister is to be filled with 12-L of sample at 2 atmospheres absolute pressure (near 30 psig) in 24 hours, the flow rate can be calculated by:

$$F = \left(\frac{12{,}000}{24 * 60}\right) \qquad 5$$

F = 8.3 cm^3/min

If the canister pressure is increased for analysis, a dilution factor (DF) is calculated and recorded on the canister label and in the field logbook. After sample analysis, detected VOC concentrations are multiplied by the dilution factor to determine concentration in the sampled air. Dilution factor can be calculated by:

$$DF = \left(\frac{P_f}{P_i}\right) \qquad 6$$

Where:

P_f = canister pressure (psig) after pressurization

P_i = canister pressure (psig) before pressurization

3.5.3 General

Depending upon available gauges and instrumentation, it may be necessary to perform unit conversions. Common unit conversions may be performed by:

Inches of Hg	to atmospheres	mult. by 0.0333
Inches of Hg	to psi	mult. by 0.490
psi	to atmospheres	mult. by 0.0680
psi	to Inches of Hg	mult. by 2.04
psig	to total psi	add 14.7

3.6 QUALITY ASSURANCE QUALITY CONTROL (QA/QC)

3.6.1 QA/QC Samples

A field duplicate sample is collected at the same time, in the same location, and under the same conditions as the sample. One field duplicate sample shall be collected for every ten samples collected. Evaluation of duplicate information shall be made by calculation of the relative percent difference (RPD). The equation is stated below.

$$RPD = \left(\frac{X1 - X2}{X1 + X2}\right) * 200 \qquad 7$$

Where:

X1 = sample value

X2 = duplicate sample value

A field replicate sample is collected in the same location, and under the same sample set up conditions as the sample with one exception, the replicate sample is collected on a different day. This SOP does not set forth specific replicate frequency requirements, however, work plans may incorporate their use.

3.6.2 QA/QC Procedures

All data must be documented on standard chain-of-custody forms and within field logbooks.

All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/ operation, and they must be documented.

4.0 MAINTENANCE

Contamination may occur in the sampling system if canisters are not properly cleaned before use. Therefore when procuring summa canisters from the contracted analytical laboratory, proof of summa canister decontamination shall be supplied with the canister. Additionally, all other sampling equipment (e.g., pump, flow controllers, tubing) should be kept clean or returned to the contracted laboratory for decontamination.

All sampling equipment and sampling media shall be protected from contact with any potentially contaminated surface soil or water. Sampling equipment shall be stored in clean areas and protected from dirt and water during transportation. Equipment may be periodically wiped clean with a clean cloth, but decontamination using solvents or liquids is to be avoided. Avoid contaminating sampling equipment or media with tape or marker fumes, snoop, or bare hands. Use new tygon or teflon tubing as appropriate for each sample event.

5.0 PRECAUTIONS

Care must be taken not to exceed 40 psig in the canisters. Canisters are under pressure, usually 20-30 psig, and should not be dented or punctured. They should be stored in a cool dry place and always be placed in their plastic shipping boxes during transport and storage.

6.0 REFERENCES

Air Toxins, 1993. "Canisters and Tedlar Bags." Volume 1 of Air Toxins Guide to Air Sampling and Analysis. 2nd Edition, April 1993.

USEPA, 1992. Summa Canister Sampling: SOP #1704. USEPA, Office of Emergency and Remedial Response (PB92-963406).

USEPA, 1989. "Determination of Volatile Organic Compounds in Ambient Air Using SUMMA Passivated Canister Sampling and Gas Chromatographic Analysis." Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air.

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STANDARD OPERATING PROCEDURE 30.7
THERMAL DESORPTION UNIT SOIL SAMPLING

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define procedures for thermal desorption unit (TDU) soil sampling.

2.0 MATERIALS

- Certified clean sample containers
- Photoizonation detector (PID)
- Stainless steel bowl and trowel
- Chemical resistant gloves
- Field logbook
- Coolers
- Ice

3.0 PROCEDURE

3.1 Sampling Treated Soils during Operation

Samples will be collected every two operating days during operation from the stockpile created from the discharge of the four TDUs. The sampler will dig from the surface toward the center of pile one to two feet at ten locations. Locations will be selected based on highest PID readings. If no readings above background are found, locations will be randomly selected. At each of the ten locations, a small volume of soil (approximately 1/10th the size of the combined volume of the remaining containers) will be placed into a stainless steel bowl. The sample will be homogenized and transferred to appropriate sample containers. The remaining sample will be discarded back into the stockpiled soil. At four locations, four grab samples will be collected for VOC analysis with a stainless steel trowel. Samples will be labeled, cooled with ice or refrigeration and packaged in accordance with SOPs 50.1, 50.2 and 50.3. Samples will be sent off-site for analysis.

3.2 Sampling Treated Soils during Proof of Performance

The sampling procedures during POP will be the same as mentioned in Section 3.1 except the stockpiles will be separated into individual piles from their respective units. During Proof of Performance, soils will be collected from six stockpiles (three test runs for both the batch and continuous units). The batch unit will have one stockpile per test and four samples will be collected for VOC analysis and ten random samples will be collected and composited for the remaining analyses from the stockpile. From the continuous unit five separate soil piles will be made per test. From these piles four VOC samples will be collected and ten samples (two from each pile) will be collected and composited as one sample for the remaining analyses.

3.3 Sampling Untreated Soils during Operation

The sampling procedures for untreated soil will be the same as mentioned in Section 3.1 except that a sample will be collected once a month and no cooling will be necessary. This monthly sampling will begin after the month in which the POP was performed.

3.4 Sampling Untreated Soils during Proof of Performance

The sampling procedures for untreated soil during the Proof of Performance will be the same as mentioned in Section 3.1, except soils will not require cooling and will be collected from six feed piles (three tests, two unit types; batch and continuous). Samples will be sent to off-site for analysis.

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STANDARD OPERATING PROCEDURE 30.8
WATER SAMPLING DURING THE TDU PROOF OF PERFORMANCE

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define procedures for water sampling during the TDU Proof of Performance (POP).

2.0 MATERIALS

- Certified clean sample containers
- Coolers
- Ice
- Chemical resistant gloves
- Field logbook
- Five gallon bucket

3.0 PROCEDURE

Sampling of condensate water will occur once per day of POP test. The test will run for six days.

1. Begin sampling three hours after the TDU startup. This ensures that water has circulated through the system.

2. Water will be purged from each sample port as needed (approximately 2 gallons) prior to collecting samples. This will remove stagnant water and settled solids from the sample port. The water shall be purged into a 5-gal bucket or similar container. Purged water will be disposed at the treatment plant.

3. A grab sample will be collected from the batch and continuous lines to the condensate tank for all parameters by opening the sample port valve and purging directly into the sample jars.

4. Samples will then be taken from the condensate tank effluent, modular tank effluent (if being used), and Baker tank effluent for TSS using the same procedure as mentioned in 3.3.

5. Water treatment plant (#2) will be sampled on the first day condensate from POP testing is received a the plant following SOP 30.9.

6. Samples will be collected in decreasing order of volatility (VOCs, SVOCs, etc.)

7. Samples will then be prepared, packed, and shipped as per SOPs 50.1, 50.2, and 50.3.

4.0 MAINTENANCE

Not Applicable

5.0 PRECAUTIONS

- Sampler will wear Tyvek coveralls, chemical resistant gloves, safety glasses, and hard hat.
- Assistant will wear chemical resistant gloves, safety glasses, and hard hat.
- Change gloves between samples.

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STANDARD OPERATING PROCEDURE 30.9
SAMPLING FOR THE WATER TREATMENT PLANT

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define procedures for the sampling of the water treatment plant.

2.0 MATERIALS

- 4-Liter certified clean composite containers
- Field logbook
- Certified clean sample containers
- Chemical resistant gloves
- Coolers
- Ice
- Clean funnels
- Five gallon bucket

3.0 PROCEDURE

3.1 Monthly

1. Sampling locations and frequency are shown in Figure 3-10 and Table 3-9 of the Field Sampling Plan.
2. A logbook shall be kept and used to record all pertinent sampling times and relevant information.
3. Water will be purged from each sample port as needed (approximately 2 gallons) prior to collecting samples. This will remove stagnant water and settled solids from the sample port. The water shall be purged into a 5-gallon bucket or similar container. Purged water will be poured into the floor drain to be treated by the Water Treatment Plant.
4. The samples will be collected in the following order: Equalization Tank Effluent (ETE), Oil Water Separator Effluent (OWS), Mix Reaction Tank Effluent (MRT), Inclined Plate Separator Effluent (IPS), Sand Filter Effluent (SFE), AOP Reactor Influent (ARI), AOP Reactor Effluent (ARE), First Carbon Effluent (LCE), and Final Discharge at Treated Water Tank Effluent (FDE).
5. Each sampling container will be filled from the appropriate sample port. Containers will be labeled, packed and shipped following the SOPs 50.1, 50.2 and 50.3.

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Standard Operating Procedure 30.10

TDU Stack Sampling Protocol

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DRAFT

PROOF OF PERFORMANCE TEST PROTOCOL

FOR THE BATCH AND CONTINUOUS
THERMAL DESORPTION UNIT OXIDIZERS
@ THE SOUTHERN MARYLAND
WOOD TREATMENT SUPERFUND SITE
25202 THREE NOTCH ROAD
HOLLYWOOD MD 20636

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Manager, Special Projects

AirRECON Project 311-81454

May 11, 1998

(H:\AIRRECON\PROTOCOL.98\1454.P.DOC)

ORIGINAL (Red)

1.0 INTRODUCTION

ICF KAISER Engineers will manage a site remediation project at the Southern Maryland Wood Treatment Superfund Site in Hollywood MD. Soil at the site is contaminated with organic compounds from a former wood treatment plant. Remediation will be performed through thermal desorption /oxidation.

To demonstrate the effectiveness of and environmental emissions from the remediation process, ICF KAISER will conduct a *Proof Of Performance* (POP) test, which will include stack emission sampling. ICF KAISER contracted AirRECON, a division of Levine·Fricke·Recon (LFR), to perform the stack emission testing.

This protocol provides a detailed description of stack sampling procedures. A detailed description of the site, the remediation process, and other POP-related activities can be found in the *Proof-of-Performance Plan* developed by ICF KAISER, dated April 1998. A copy of the plan is found in Attachment 1.

1.1 JOB-SITE

Southern Maryland Wood Treatment Superfund Site
25202 Three Notch Road
Hollywood MD 20636

Contact: Kirk Ticknor, PE, Site Manager
Phone: 301-373-5834
Fax: 301-373-5975

1.2 PLANT INFORMATION

Source: Batch TDU Oxidizer, Continuous TDU Oxidizer
Contract No. DACA31-95-D-0083, Task No. 16

1.3 PLANT SAFETY REQUIREMENTS

The plant safety policy requires personnel working onsite to have current 40-hour OSHA Hazardous Worker Training and to wear a hard hat, safety glasses, and safety boots.

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3.0 SAMPLING LOCATIONS

Sample diagrams of the test locations are in Attachment 2. All measurements will be field-verified and conform to EPA Reference Method 1 (or 1A). A description of the sample location(s) follow.

3.1 BATCH TDU

Outlet: Measurement will take place in a circular stack having an inside diameter of 4 inches. Several sample ports are available on the stack as per the attached diagrams. Because of the small duct diameter, flow measurements will take place down-stream of the sample extraction ports.

Inlet: Measurement will take place in a circular stack having an inside diameter of 4 inches. Several sample ports are available on the stack as per the attached diagrams. Because of the small duct diameter, flow measurements will take place down-stream of the sample extraction ports.

3.2 CONTINUOUS TDU

Outlet: Measurement will take place in a circular stack having an inside diameter of 8 inches. The test ports are located 48 inches downstream (EPA Distance "B" = 6 duct diameters) and >16 inches upstream (EPA Distance "A" = 2 duct diameters) of flow disturbances. 16 traverse points (8 points/port) will be measured.

Inlet: Measurement will take place in a circular stack having an inside diameter of 8 inches. The test ports are located 24 inches downstream (EPA Distance "B" = 3 duct diameters) and 12 inches upstream (EPA Distance "A" = 1.5 duct diameters) of flow disturbances. 24 traverse points (12 points/port) will be measured.

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5.0 SAMPLING PROCEDURES

5.1 BATCH TDU FLOW RATE & SAMPLE EXTRACTION

The Batch TDU has a 2" inlet pipe which is unsuitable for isokinetic sampling because of its small diameter. A standard pitot tube will be fixed at the centroid of the pipe to measure gas velocity. Sample will be extracted at a constant rate, upstream of the pitot tube at a single point at the center of the pipe.

The batch TDU outlet is 4" in diameter. A standard pitot will be used to traverse the stack downstream of the sample extraction ports. Sample will be extracted from the centroid of the stack. Sample rate (except VOST) will be set for isokinetic conditions based on the average stack velocity found with the traverse. VOST sampling will be at a constant rate.

5.2 DIOXINS/FURANS, SEMI-VOLATILES, PAHs

SUMMARY: Stack gas will be sampled isokinetically for dioxin/furan emissions in accordance USEPA Method 23, *Determination of polychlorinated dibenzo-p-dioxin and polychlorinated Dibenzofurans from Stationary Sources*.

Dioxins and furans in sample gas will be collected on a filter and solid sorbent trap. The procedure will be enhanced for the collection of semi-volatile organic compounds (SVOC) and polynuclear aromatic hydrocarbons (PAHs) in accordance with EPA SW846 Method 0010.

SVOC and PAH also will be collected in aqueous impinger reagents. Recovered samples will be extracted and analyzed by gas chromatography and mass spectroscopy (GC/MS) for dioxins/furans, PAH, and SVOC. The full list of SVOC compounds is presented in Attachment 3

Key sample train components will include:

- A sized, tapered-edge, glass "button-hook" sample nozzle
- A stainless-steel sample probe with a heated glass-liner, S-type or standard pitot tube, and thermocouple
- A heated glass filter holder with a glass-fiber filter supported by a Teflon frit
- A glass condenser and coolant circulation system
- A solid glass sorbent trap packed with field-spiked XAD-2
- A condenser system consisting of Greenburg-Smith glass impingers and connecting pieces

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- A post-test leak check will be performed on the entire sample train at a vacuum equal or greater than the highest vacuum achieved during the test run. If the leak rate is greater than 0.02 CFM, the run will either be voided/repeated or kept and corrected for the leak-rate (at the discretion of the administrator)
- All necessary data for each sample point and test run will be recorded on appropriate data forms.

SAMPLE RECOVERY: Sample recovery will be performed at the site in a sheltered area. Samples will be recovered as follows:

Stack Samples:

- Each impinger will be weighed to 0.5 gm
- The particulate filter and loose particulate will be transferred to container 1, a glass petri dish
- With a Teflon brush, the probe, nozzle, and front-half of the filter holder will be rinsed and brushed three times with acetone into container 2 (250 ml amber glass)
- Into container 2, the back-half of the filter holder, condenser, and connecting pieces will be rinsed with acetone
- All train components from the sample nozzle up to the sorbent cartridge will be rinsed three times with methlyene chloride into container 2
- All train components from the sample nozzle up to the sorbent cartridge will be rinsed three times with toluene into container 3 (250 ml amber glass)
- The impinger catch will be transferred to one or more (depending on liquid volume) large amber glass jars, containers 4A, B, C., etc
- A rinse of the impinger train with a 50%/50% v/v mixture of methylene chloride and methanol will be collected in container 5 (250 ml amber glass)
- The sorbent trap will be sealed with Teflon tape and returned to its shipping material.

BLANKS: The following blanks samples will be recovered. Liquid volumes will be similar to those used for stack sample recovery.

- Container 1: Glass petri dish with an unused filter
- Container 2: 250 ml amber glass jar containing acetone and methylene chloride
- Container 3: 250 ml amber glass jar containing toluene
- Container 4: 500 ml amber glass jar containing 200 mls distilled water
- Container 5: 250 ml amber glass jar containing 50%/50% v/v methylene chloride and methanol
- An unused trap will be recovered as a blank

SAMPLE ANALYSIS: Sample preparation and analysis will be performed in general accordance with the schematic diagram in Figure 1, which is on the following page.

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5.3 PARTICULATES and HYDROGEN CHLORIDE

SUMMARY: Stack gas will be sampled isokinetically for suspended (filterable) particulate and hydrogen chloride emissions in accordance with EPA Method 5 "*Determination of Particulate Emissions From Stationary Sources.*" Particulate in the sampled gas will be collected in the sample train on a heated filter.

The sample procedure will be enhanced for the collection of hydrogen chloride by EPA Method 26A "*Determination of Hydrogen Halide Emissions from Stationary Sources.*" Recovered samples will then be analyzed for particulate matter in accordance with EPA Method 5 and for hydrogen chloride in accordance with EPA Method 26. Inlet particulate samples will not be recovered since inlet particulate sampling is not required.

Key sample train components will include:

- A sized, tapered-edge, stainless steel "button-hook" sample nozzle
- A stainless steel sample probe with a heated glass liner and thermocouple
- A heated glass filter holder with a tared Teflon filter supported by a Teflon frit
- A condenser system consisting of Greenburg-Smith glass impingers and connecting pieces
- A sample control/metering system consisting of a vacuum pump, dry gas meter, sample flow controls, sample rate manometer, stack gas velocity manometer, temperature indicator, and heat controllers.

PREPARATIONS: Sampling glassware and sample containers will be cleaned prior to sampling in the following sequence:

- Soap and water wash and rinse
- Triplicate rinse with distilled, de-ionized water (probe, nozzle and filter holder)
- Acetone rinse, (probe, nozzle and filter holder)

The condenser will consist of five impingers. All impingers (except the third) will be a Greenburg-Smith, modified with unrestricted impinger tubes. Impinger 3 will be a standard Greenburg-Smith impinger. Each impinger will be charged for sampling as follows:

- Impinger 1 & 2, 100 mls 0.1N H_2SO_4 in each
- Impinger 3 & 4, 100 mls 0.1 N NaOH in each
- Impinger 5, silica gel.

All impingers will be weighed prior to sampling.

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This method is applicable for the determination of volatile organic compounds. It is commonly called a VOST train. Because some of the volatiles on the list have boiling points below 35°C, the train will sample one-half the normal sample rate (SLO-VOST). Samples will be analyzed for the volatiles by thermal desorption, purge-and-trap and gas chromatography/mass spectrometry (GC/MS). The list of target VOCs is presented in Attachment 2.

Key components of the VOST sampling train are:

- A stainless steel probe with a borosilicate glass lining that is electrically heated to maintain sample temperature above 130°C (266°F).
- A glass bore isolation valve with sliding Teflon plug.
- Two glass sorbent tubes. Sample first passes through a Tenax packed tube and then a Tenax/charcoal tube.
- A condensation system consisting of two glass condensers through which ice water is circulated. The first condenser is located between the sample probe and first sorbent tube and the second is located between the first and second sample tube. Condensate is collected in flasks.
- Thermocouples to monitor the temperature of sample gas upstream of each resin trap to prevent thermal breakthrough of analytes.
- A metering system consisting of a pump, dry gas meter capable of measuring volume as low as 0.005 liters, a calibrated rotameter to monitor gas flow rate, a 10-channel temperature monitor and timer.

PREPARATIONS: Sample glassware is ultrasonically cleansed in a non-ionic detergent, rinsed with distilled water and oven dried.

SAMPLING: Completion of each test run will include the following key procedures:

- The sampling train will be assembled and checked for leaks at the site prior to sampling. The leak check is performed by closing the valve upstream of the condenser and pulling a vacuum 10 inches higher than normal operating pressures. Any potential leak rates will be less than 0.1 inch Hg after 1 minute.

- Four pairs of tubes will be sampled per test run. Three will be analyzed, one will be a spare.
- Each tube pair will be sampled for 40 minutes at 0.5 liters per minute
- Key sample data will be recorded every ten minutes on an appropriate data form.

SAMPLE RECOVERY: Recovered condensate will be placed in glass vials and filled with distilled water until no head space exists. All spent sample tubes will be returned to their original containers for shipment. Individual cartridges will not be recovered until analysis. Three pairs of cartridges will be used for blanks.

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The condenser will consist of Greenburg-Smith impingers, interconnected with glass U-bends. Reagent charging and stem configurations will be as follows:

- Impinger 1 / (optional): Empty, short-stem
- Impinger 2: Restricted tip with 5% HNO_3/10% H_2O_2
- Impinger 3: Unrestricted tip with 100 mls 5% HNO_3/10% H_2O_2
- Impinger 4: Unrestricted tip, empty
- Impinger 5: Restricted tip with 100 mls 4% $KMNO_4$/10% H_2SO_4
- Impinger 6: Unrestricted tip with 100 mls 4% $KMNO_4$/10% H_2SO_4 each
- Impinger 7: Unrestricted tip, silica gel.

All impingers will be weighed prior to sampling to 0.5 grams. 5% HNO_3/10% H_2O_2 will be used within one month of preparation and 4% $KMNO_4$/10% H_2SO_4 will be used within 24 hours of preparation.

SAMPLING: Completion of each test run will include the following key procedures:

- A pre-test leak check of the entire sample train at a vacuum greater than that anticipated for the test run. A leak rate of no greater than 0.02 CFM will be achieved prior to run commencement.
- Each sample point will be sampled for an equal duration.
- Filter holder hot box temperature will be maintained at 250 $\pm$/- 25 °F.
- Probe heat will be maintained to prevent internal moisture condensation
- Ice will be maintained in the impinger ice bath.
- All necessary temperature and sample rate adjustments (to maintain isokinetic sampling) will be made at each sample point.
- A post-test leak check will be performed on the entire sample train at a vacuum equal or greater than the highest vacuum achieved during the test run. If the leak rate is greater than 0.02 CFM, the run will either be voided/repeated or kept and corrected for the leak-rate (at the discretion of the administrator).
- All necessary data for each sample point and test run will be recorded on appropriate data forms.

SAMPLE RECOVERY: Sample recovery will be performed in the field in a sheltered area. ***Stack samples*** will recovered as follows:

- Each impinger will be weighed to 0.5 gm.
- The particulate filter and loose particulate will be transferred to container 1, a plastic petri dish.
- With a non-metallic brush, the probe, nozzle and front-half of the filter holder will be rinsed and brushed three times with a total of 100 ml of 0.1N HNO_3 into container 2 (high density polyethylene, HDPE)

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6.0 QUALITY ASSURANCE

The protocol was developed in accordance with the principles and recommendations outlined in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems.

6.1 SAMPLE PRESERVATION

All dioxin/furan, SVOC, PAH, and VOC sample fractions will be preserved with ice from the time of sample recovery until sample analysis preparation.

Remaining samples are preserved by their own matrices.

6.2 SAMPLE HANDLING

All sampling and sample recovery will be performed by AirRECON personnel. All samples will be labeled by project name, sample date, sample fraction, sample location and run number.

Recovered samples will be shipped to a laboratory furnished by ICF Kaiser.

6.3 CHAIN-OF-CUSTODY

Each sample will be recorded on a chain-of-custody (COC)/request-for- analysis form. The COC is completed to ensure the integrity of the samples collected. Before relinquishing the sample, the project manager must complete a COC listing his/her name, the name of the person receiving the results, the AIRRECON project number, the sample description (media), the sample date, and who performed the sampling.

The COC must also identify the source of the sample, describe the container holding the sample and the preservative (if any). Additional comments or notes can be placed at the bottom of the page.

6.4 CALIBRATION DATA

All pre-test calibration data for sampling and equipment will be made available onsite, at the time of testing to any regulatory representatives. Copies of all calibration data will be included in the final report.

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6.6 FINAL REPORT

Emissions of each pollutant will be reported in mg/M_3, grams/second and pounds/hour. Emissions of CO_2 and O_2 will be reported as a percent by volume.

AirRECON's final test report for this project will include the following items:

- Summary
- Personnel and Certifications
- Sampling location diagrams
- Velocity and flow rate data
- Cyclonic flow data
- Gas composition data
- Emissions data
- Process information
- Procedures checklist
- Selected nomenclature & laboratory information sheet
- Approved test protocol
- Equipment calibration data
- Original test data
- Calculations
- Laboratory data

Submitted by:

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Manager, Special Projects

Reviewed by:

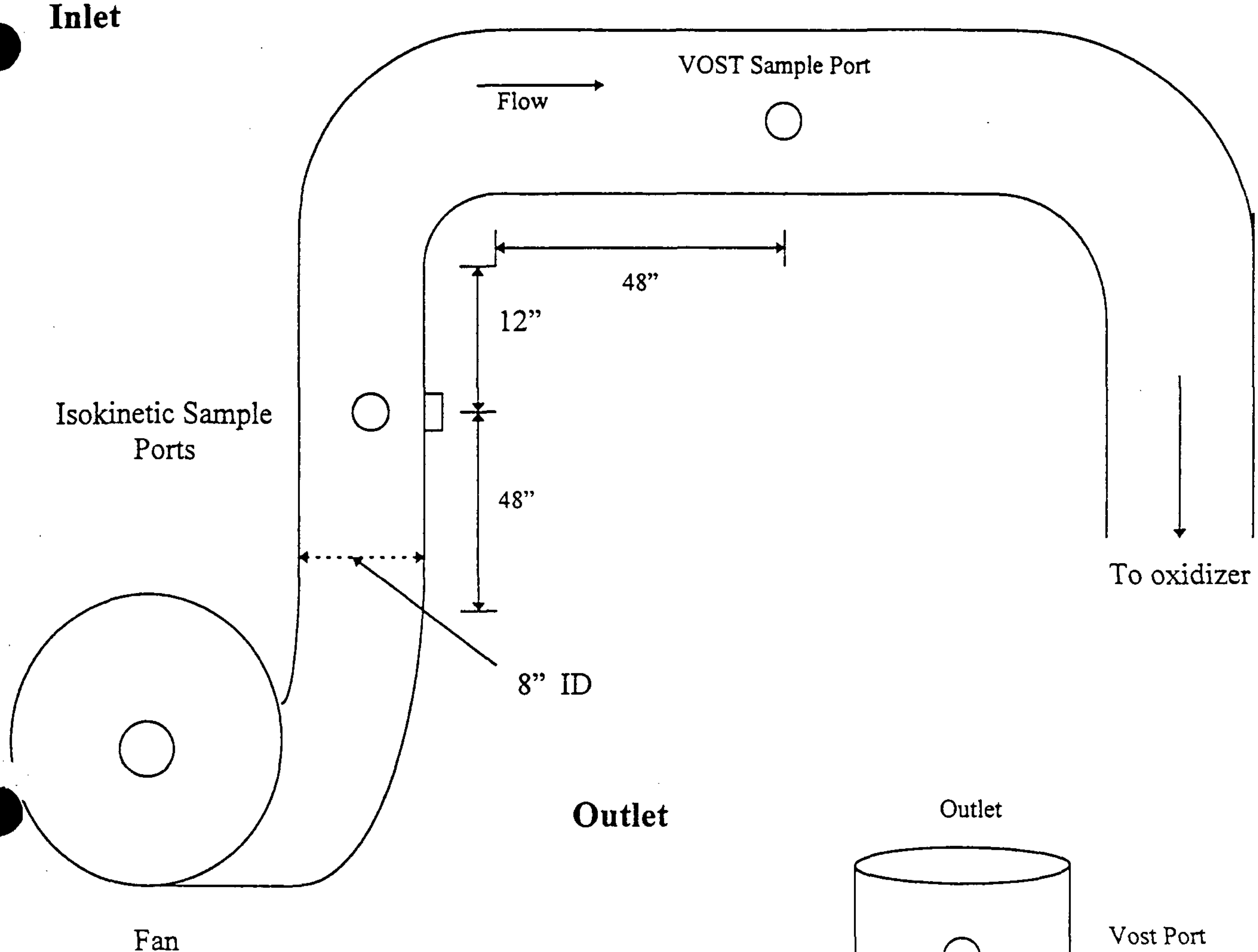
Thomas P. Brown, REM
Manager, Air Projects

TFM/prh (H:\AIRRECON\PROTOCOL.98\1454.P.DOC)

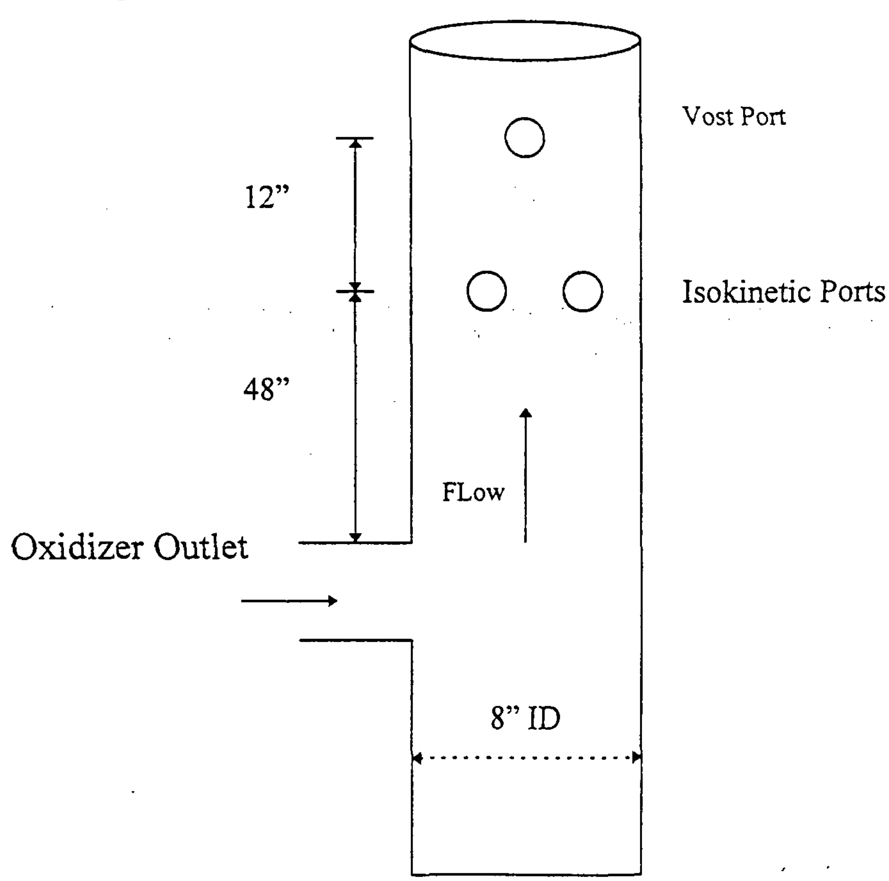
ICF Kaiser / Southern Maryland Wood Treatment Superfund Site, Hollywood MD
Continuous TDU Sample Locations

ORIGINAL (Red)

Inlet



Outlet



ATTACHMENT 3

TARGET ORGANIC COMPOUNDS

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Acetone
Benzene
Bromodichloromethane
Bromoform
Bromomethane
2-Butanone
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene
2-Hexanone
4-Methyl-2-pentanone
Methylene chloride
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl chloride
Xylene (total)

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SOP 30.10A (Revision to TDU Stack Sampling Protocol)

Replace Section 5.4 of SOP 30.10A with the following:

Summary: This method is applicable for the determination of volatile organic compounds. It is commonly called a VOST train. Because some of the volatiles on the list have boiling points below 35°C, the train will sample at less than one-half the normal sample rate (SLO-VOST). Samples will be analyzed for the volatiles by thermal desorption, purge-and-trap gas chromatography/mass spectrometry (GC/MS). The list of target VOCs is presented in Attachment 2.

Key components of the VOST sampling train are:

- A stainless steel probe with a borosilicate glass lining that is electrically heated to maintain sample temperature above 130°C (266°F).
- A glass bore isolation valve with sliding Teflon plug.
- Two glass sorbent tubes. Sample first passes through a Tenax packed tube and then a Tenax/charcoal tube.
- A condensation system consisting of two glass condensers through which ice water is circulated. The first condenser is located between the sample probe and first sorbent tube and the second is located between the first and second sample tube. Condensate is collected in flasks.
- Thermocouples to monitor the temperature of sample gas upstream of each resin trap to prevent thermal breakthrough of analytes.
- A metering system consisting of a pump, dry gas meter capable of measuring volume as low as 0.005 liters, a calibrated rotameter to monitor gas flow rate, and a temperature monitor and timer.

PREPARATIONS: Sample glassware is ultrasonically cleansed in a non-ionic detergent, rinsed with distilled water and oven dried.

SAMPLING: Completion of each test run will include the following key procedures:

- The sampling train will be assembled and checked for leaks at the site prior to sampling. The leak check is performed by closing the valve upstream of the condenser and pulling a vacuum 10 inches higher than normal operating pressures. Acceptable leak rates will be less than 0.1 inch Hg after 1 minute.
- Four pairs of tubes will be sampled per test run. Three will be analyzed; one will be a spare.
- Each tube pair will be sampled for up to 40 minutes at rates less than 0.5 liters per minute to yield known sample volumes from approximately 0.5 liter to 5 liters.
- Key sample data will be recorded every ten minutes on an appropriate data form.

SAMPLE RECOVERY: Recovered condensate will be placed in glass vials and filled with distilled water until no headspace exists. All spent sample tubes will be returned to their original containers for shipment. Individual cartridges will not be recovered until analysis. Three pairs of cartridges will be used for blanks.

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STANDARD OPERATING PROCEDURE 50.1
SAMPLE LABELS

1.0 SCOPE AND APPLICATION

Every sample will have a sample label uniquely identifying the sampling point and analysis parameters. The purpose of this standard operating procedure (SOP) is to delineate protocols for the use of sample labels. An example label is included as Figure 50.1-A. Other formats with similar levels of detail are acceptable.

2.0 MATERIALS

- Sample label
- Indelible marker

3.0 PROCEDURE

The use of preprinted sample labels is encouraged and should be requested from the analytical support laboratory during planning activities.

As each sample is collected, fill out a sample label ensuring the following information has been collected:

- Project Name
- Project Number
- Location/Site I.D. - enter the well number or surface water sampling number, and other pertinent information concerning where the sample was taken.
- Date of Sample Collection
- Time of Sample Collection
- Analyses to be Performed (Note: due to number of analytes, details of analysis should be arranged with lab *a priori.)*
- Whether Filtered or Unfiltered (water samples only)
- Preservatives (water samples only)

Double-check the label information to make sure it is correct. Detach the label, remove the backing and apply the label to the sample container. Cover the label with clear tape, ensuring that the tape completely encircles the container.

Record the Sample Number and designated sampling point in the field logbook, along with the following sample information:

- Time of sample collection (each logbook page should be dated)
- The location of the sample
- Organic vapor meter or photoionization meter readings for the sample (when appropriate)
- Any unusual or pertinent observations (oily sheen on groundwater sample, incidental odors, soil color, grain size, plasticity, etc.)
- Number of containers required for each sample
- Whether the sample is a QA sample (split, duplicate or blank)

A typical logbook entry might look like this:

7:35 AM Sample No. MW-3. PID = 35 PPM
Petroleum odor present. Sample designated MW-3-001.

The suffix duplicate will be added to Sample ID for duplicating samples.

4.0 MAINTENANCE

Not Applicable.

5.0 PRECAUTIONS

Note that although incidental odors should be noted in the logbook, it is unwise from a health and safety standpoint to routinely "sniff test" samples for contaminants.

6.0 REFERENCES

USEPA. 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*. QAMS-005/80.

ORIGINAL (Red)

STANDARD OPERATING PROCEDURE 50.2
SAMPLE PACKAGING

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to delineate protocols for the packing and shipping of samples to the laboratory for analysis.

2.0 MATERIALS

- Waterproof coolers (hard plastic or metal)
- Metal cans with friction-seal lids (*e.g.* paint cans)
- Chain-of-custody forms
- Chain-of-custody seals (optional)
- Packing material
- Sample documentation
- Ice
- Plastic garbage bags
- Clear Tape
- Zip seal plastic bags

3.0 PROCEDURE

1. Check cap tightness and verify that clear tape covers label and encircles container.
2. Wrap sample container in bubble wrap or closed cell foam sheets. Samples may be enclosed in a secondary container consisting of a clear zip-seal plastic bag.
3. Place several layers of bubble wrap, or at least 1" of vermiculite on the bottom of the cooler. Line cooler with open garbage bag, place all the samples upright inside the garbage bag and tie.
4. Double bag and seal loose ice to prevent melting ice from soaking the packing material. Place the ice outside the garbage bags containing the samples.
5. Pack shipping containers with packing material (closed-cell foam, vermiculite, or bubble wrap). Place this packing material around the sample bottles or metal cans to avoid breakage during shipment.
6. Enclose all sample documentation (i.e., Field Parameter Forms, Chain-of-Custody forms) in a waterproof plastic bag and tape the bag to the underside of the cooler lid. If more than one cooler is being used, each cooler will have its own documentation. Add the total number of shipping containers included in each shipment on the chain-of-custody form.
7. If required, seal the coolers with signed and dated custody seals so that if the cooler were opened, the custody seal would be broken. Place clear tape over the custody seal to prevent damage to the seal.
8. Tape the cooler shut with packing tape over the hinges and place tape over the cooler drain.
9. Ship all samples via overnight delivery on the same day they are collected if possible.

4.0 MAINTENANCE

Not Applicable.

5.0 PRECAUTIONS

5.1 PERMISSIBLE PACKAGING MATERIALS

- Non-absorbent
  - bubble wrap
  - closed cell foam packing sheets
- Absorbent
  - Vermiculite

5.2 NON-PERMISSIBLE PACKAGING MATERIALS

- Paper
- Wood shavings (excelsior)
- Cornstarch "peanuts"

6.0 REFERENCES

USEPA. 1990. *Sampler's Guide to the Contract Laboratory Program.* EPA/540/P-90/006, Directive 9240.0-06, Office of Emergency and Remedial Response, Washington, D.C., December 1990.

USEPA. 1991. *User's Guide to the Contract Laboratory Program.* EPA/540/O-91/002, Directive 9240.0-01D, Office of Emergency and Remedial Response, January 1991.

USEPA. 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans.* QAMS-005/80.

ORIGINAL Red

STANDARD OPERATING PROCEDURE 50.3
SAMPLE PRESERVATION AND CONTAINER REQUIREMENTS

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define the preservatives and techniques to be employed in preserving environmental samples between collection and analysis.

2.0 MATERIALS

2.1 SAMPLE CONTAINERS

2.1.1 40-mL Glass Vial, 24 mm Neck Finish

- **Closure:** White polypropylene or black phenolic, open top, screw cap, 15-mm opening, 24-400 size.
- **Septum:** 24-mm disc of 0.005-in PTFE bonded to 0.120-in silicon for total thickness of 0.125-in.

2.1.2 1-L High Density Polyethylene, Cylinder-Round Bottle, 28-mm Neck Finish

- **Closure:** White polyethylene cap, white ribbed, 28-410 size; F217 polyethylene liner.

2.1.3 120-mL Wide Mouth Glass Vial, 48-mm Neck Finish

- **Closure:** White polyethylene cap, 40-480 size; 0.015-mm PTFE liner.

2.1.4 250-mL Boston Round Glass Bottle

- **Closure:** White polypropylene or black phenolic, open top, screw cap.
- **Septum:** Disc of 0.005-in PTFE bonded to 0.120-in silicon for total thickness of 0.125-in.

2.1.5 8-oz Short, Wide Mouth, Straight - Sided, Flint Glass Jar, 70-mm Neck Finish

- **Closure:** White polypropylene or black phenolic, baked polyethylene cap, 48-400 size; 0.030-mm PTFE liner.

2.1.6 4-oz Tall, Wide Mouth, Straight - Sided, Flint Glass Jar, 48-mm Neck Finish

- **Closure:** White polypropylene or black phenolic, baked polyethylene cap, 48-400 size; 0.015-mm PTFE liner.

2.1.7 1-L amber, Boston Round, Glass Bottle, 33-mm Pour-Out Neck Finish

- **Closure:** White polypropylene or black phenolic, baked polyethylene cap, 33-430 size; 0.015-mm PTFE liner.

2.1.8 500-mL High-Density Polyethylene, Cylinder Bottle, 28-mm Neck Finish

- **Closure:** White polypropylene, white ribbed, 28-410 size; F217 polyethylene liner.

2.2 SAMPLE PRESERVATIVES

- HCl
- HNO_3
- H_2SO_4
- $NaOH$
- Ice

3.0 PROCEDURE

Containers must be certified clean, with copies of laboratory certification furnished to the contracting officer's representative (COR).

Water samples will be collected according to procedures detailed in SOPs 30.2 and 30.3 and placed in containers appropriate to the intended analyte as given in Table 50.3-A.

- Samples taken for volatile organic compound (VOC) analysis will generally be collected in pre-preserved VOC vials. Sufficient HCl should have been added to the vial prior to the addition of the sample such that the $pH<2$.
- Samples collected for metals analysis will be acidified in the field to a $pH < 2$ by the addition of HNO_3. Filtered samples will be acidified after filtration. After acidifying the sample, the container should be lightly capped, then swirled to thoroughly mix the sample. The cap will then be loosened to release any excess pressure this operation may have generated.
- Samples collected for cyanide will be alkalized to a $pH > 12$ by the addition of NaOH.
- Samples not requiring chemical preservation will be placed on ice and cooled to 4°C (e.g., semivolatile organic compounds, explosives).
- Soil and sediment, samples will be collected according to procedures detailed in SOPs 30.1 and 30.4 into containers appropriate to the intended analyte as given in Table 50.3-B.
- No chemical preservatives will be added to soil or sediment samples. These samples will be immediately placed on ice and cooled to 4°C.

4.0 MAINTENANCE

Not applicable.

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Table 50.3-A
Summary of Sample Containment and Sample Preservation for Aqueous Samples

Parameter	Sample Container: Quantity	Sample Container: Type	Preservation Methods	Holding Times
Groundwater				
Volatile Organic Compounds	3	40-mL, amber glass vials. Teflon®-lined septum cap	HCl to pH<2 Cool, 4±2°C	7 days
Semivolatile Organic Compounds	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Extraction: 7 days Analysis: 40 days
Pesticides/PCBs	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Extraction: 7 days Analysis: 40 days
Explosives	1	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Extraction: 7 days Analysis: 40 days
Dioxin/Furans	1	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Extraction: 7 days Analysis: 40 days
Herbicides	1	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Extraction: 7 days Analysis: 40 days
Common Anions Chloride, fluoride, bromide, sulfate	1	1-liter, polyethylene bottle	Cool, 4±2°C	28 days
Nitrate-Nitrite	1	1-liter, polyethylene bottle	H_2SO_4 to pH<2 Cool, 4±2°C	28 days
Total phosphate	1	1-liter, polyethylene bottle	H_2SO_4 to pH<2 Cool, 4±2°C	28 days
Total Petroleum Hydrocarbons	1	250-mL, amber glass, Teflon®-lined cap	H_2SO_4 to pH<2 Cool, 4±2°C	Extraction: 7 days Analysis: 40 days
Metals	1	1-liter, polyethylene bottle	HNO_3 to pH<2 Cool, 4±2°C	6 months
Mercury				28 days
Cyanide	1	1-liter, polyethylene bottle	NaOH to pH>12 Cool, 4±2°C	14 days

[a]The Hexachloro-compounds include the following: hexachlorobenzene, hexachloroethane, hexachlorocyclopentadiene, and hexachlorobutadiene.

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Table 50.3-C
Summary of Sample Containment and Sample Preservation for Solid IDW Samples

Parameter	Sample Container: Quantity	Sample Container: Type	Preservation Methods	Holding Times
TCLP VOCs	1	500-mL, wide-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Leaching: 14 days Analysis: 14 days
TCLP SVOCs	1	500-mL, wide-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Leaching: 14 days Extraction: 7 days Analysis: 40 days
TCLP Pesticides	1	500-mL, wide-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Leaching: 14 days Extraction: 7 days Analysis: 40 days
TCLP Herbicides	1	500-mL, wide-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Leaching: 14 days Extraction: 7 days Analysis: 40 days
TCLP Metals	1	500-mL, wide-mouth amber glass, Teflon®-lined cap	Cool, 4±2°C	Leaching: 14 days Analysis: 6 months Mercury analysis: 28 days

SVOC Semivolatile Organic Compound
TCLP Toxicity Characteristic Leachate Procedure
VOC Volatile Organic Compound